DOCUMENT RESUME

ED 149 658 HE 009 569

AUTHOR	Wilson, Kenneth M.
TITLE	Of Time and the Doctorate: Report of an Inquiry into the Duration of Doctoral Study. SREB Research Monograph No. 9.
INSTITUTION	Southern Regional Education Board, Atlanta, Ga.
SPONS AGENCY	Carnegie Corp. of New York, N.Y.
REPORT NO	SREB-RM-9
PUB DATE	65
NOTE	213p.; Footnotes may be marginally legible due to small type
EDRS PRICE	MF-$0.83 HC-$11.37 Plus Postage.
DESCRIPTORS	Bibliographies; Comparative Statistics; *Degree Requirements; *Doctoral Degrees; *Doctoral Programs; *Doctoral Theses; Financial Support; *Graduate Students; Graduate Study; Higher Education; National Surveys; Program Evaluation; Questionnaires; Statistical Data; Student Financial Aid; *Time Factors (Learning)

ABSTRACT

Research co-sponsored by the Conference of Deans of Southern Graduate Schools and the Southern Regional Education Board on the duration of doctoral study is reported in this book. Over 1,900 recipients of a doctoral degree (representing over 120 graduate departments) cooperated along with the graduate deans and selected faculty representatives. Specific topics cover: time taken to attain the doctorate; factors affecting duration of doctoral study; delays and discontinuities in progress to the doctorate; patterns of financial assistance and support; the dissertation requirement; the foreign language requirement; differences among institutions and departments: selected indices of duration; contrasts between faster and slower groups; respondents' suggestions for time-reduction; and suggestions for further understanding and effective action. Appended are (1) the questionnaires and selected characteristics of the study sample; (2) comparative data on BA-PhD time lapse for selected fields, periods, and groups; and (3) tabular summary of major findings. A 34-item bibliography is also included. (LBH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

SREB Research Monograph Number 9

ED149658

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

OF TIME AND THE DOCTORATE

by KENNETH M. WILSON

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM

SREB RESEARCH MONOGRAPH NO. 9

Of Time And The Doctorate–

Report of An Inquiry Into the Duration of Doctoral Study

by
KENNETH M. WILSON

SOUTHERN REGIONAL EDUCATION BOARD
130 Sixth St., N.W.
Atlanta, Georgia 30313
1965

This study was financed in part by funds made available through a grant from the Carnegie Corporation of New York.

Foreword

One of the omnipresent problems of advanced graduate education is the fact that students take such a long time to earn their doctorates—indeed, such a large proportion never finish writing the dissertation that they have been categorized under the pseudodegree designation *ABD* (All But the Dissertation). Considering the widespread nature of this phenomenon, it is amazing that until quite recently very little empirical evidence has been available concerning its extent and characteristics.

This study was conducted by Kenneth M. Wilson, Research Associate, Southern Regional Education Board, with the assistance and advice of a committee composed of three graduate deans: the late Dudley R. Hutcherson of the University of Mississippi; Alexander Heard, formerly of the University of North Carolina and now Chancellor, Vanderbilt University; and J. B. Page, formerly of Texas A & M University and now at the Iowa State University. John K. Folger, formerly Associate Director for Research, Southern Regional Education Board, and now Graduate Dean, Florida State University, also provided advice and assistance. In 1963, a summary and commentary on the study by Alexander Heard was published by SREB under the title, *The Lost Years in Graduate Education*. It is a pleasure now to make available a comprehensive report of the Southern study.

In a number of respects the information collected was sufficiently comparable to the types of information collected in certain national studies to make comparisons possible. In general these comparisons indicate that, insofar as the length of doctoral training is concerned, the experiences of Southern graduate schools are quite similar to those of institutions in other parts of the country. In several respects, however, the Southern study deals with aspects of the question upon which previous studies have not touched, and for this reason, it should be of more than regional interest and importance.

WINFRED L. GODWIN, *Director*
Southern Regional Education Board
Atlanta, Georgia

Acknowledgments

The research reported herein was co-sponsored by the Conference of Deans of Southern Graduate Schools and the Southern Regional Education Board, and it was financed in part by funds available through a grant from the Carnegie Corporation of New York to the Southern Regional Education Board for the promotion of research on higher education.

The project was made possible by the cooperation of over 1,900 recipients of a doctoral degree, representing over 120 graduate departments and 15 doctoral fields in more than a score of Southern institutions, and the direct support and sustained interest of graduate deans and selected faculty representatives at participating institutions.

Help in planning the study was provided by an advisory committee comprised of the late Dean Dudley R. Hutcherson (University of Mississippi), Dean J. B. Page, Iowa State University (formerly of Texas A & M University), and Chancellor Alexander Heard, Vanderbilt University (formerly Dean of the Graduate School, University of North Carolina). John K. Folger, Dean of the Graduate School, Florida State University (formerly Associate Director for Research, SREB) was also active in all phases of planning.

During the preliminary stages of the project, Herbert Soldz, Associate Director of Research, Office of Scientific Personnel, helpfully provided special tabulations from NRC rosters of data on BA-PHD time lapse during the period 1950-1956 for graduates of institutions located in the 16-state SREB-Compact area.

The exacting process of coding and processing data from questionnaires was conducted in the Institute for Social Research, Florida State University, under the supervision of Charles M. Grigg, Director.

James L. Miller, Jr. (Associate Director, SREB) and E. F. Schietinger (Research Associate, SREB) gave generously of time

and thought to critical evaluation of the manuscript at several points in its development.

In a variety of ways, all the foregoing contributed substantially to the study and their contributions are acknowledged with appreciation and thanks. They should not be held accountable, however, for interpretations or conclusions expressed in the report. For these the writer assumes full responsibility.

Kenneth M. Wilson
Atlanta, Georgia

January 1965

Table of Contents

Foreword iii

Acknowledgments v

Chapter

I Introduction 1

The Duration Issue
Need for Basic Information
A Regional Inquiry
Some Facts About the Study Sample
The Question of Representativeness

II Time Taken To Attain the Doctorate 19

Elapsed-time Indices of Duration
Graduate Attendance
Predoctoral Employment Patterns
Age at Time of Degree Conferral
Major Trends

III Factors Affecting Duration of Doctoral Study: Respondents' Evaluations 41

Views from the Graduate School
Graduates' Assessments of Designated Factors
Recapitulation

IV Delays and Discontinuities in Progress to the Doctorate 61

Timing of Development of Graduate Study Goals and Disciplinary Interests

8

(IV Con't)

Incidence of Delayed Entry and Interruptions in Graduate Study
Factors Associated with Delayed Entry and Interruptions in Attendance
Institutional Attendance and Degree Patterns
General Observations

V Patterns of Financial Assistance and Support . . 77

Major Sources of Assistance and Support
Graduate Appointments
Fellowship Grants
Summary of Major Trends

VI The Dissertation Requirement 95

Timing of Formal Approval of Topic
Progress Toward Completion of the Dissertation Requirement
Time Spent on the Dissertation
Contribution of the Research Assistantship
Summary

VII The Foreign Language Requirement 109

Pattern of Doctoral Languages
Need for Special Preparation
Incidence of Language Study in College
A Brief Analysis

VIII Differences Among Institutions and Departments: Selected Indices of Duration 117

Time Taken to Attain the Doctorate: Differences by Department
Median Age of Graduates: Departmental Variation
Summary

IX Contrasts Between Faster and Slower Groups . . 125

Predoctoral Employment
Graduate Attendance
Continuity of Study

Graduate Study Goals and Development of Disciplinary Interests
Patterns of Financial Support
Preliminary Examinations and the Dissertation
The Foreign Language Requirement
Research Orientation in Postdoctoral Employment
Family Status
Other Factors
Summary

X Respondents' Suggestions for Time-Reduction . . 149

Trends in the Responses of Graduates
Trends in the Responses of Institutional-Departmental Representatives
An Overview

XI Toward Further Understanding and Effective Action 161

Discontinuities in the Ph.D. Preparation Process
Disciplinary Diversity
Toward Greater Programmatic Structure

References 179

Appendix A: The Questionnaire and Selected Characteristics of the Study Sample 185

Appendix B: Comparative Data on BA-PHD Time Lapse for Selected Fields, Periods, and Groups 201

Appendix C: Tabular Summary of Major Findings . . 205

CHAPTER 1

Introduction

One of the most significant developments of recent years has been increased public recognition of the crucial importance to modern society of individuals with advanced graduate and professional preparation, accompanied by increased demand and heightened competition for the services of such individuals to fill positions in industry, government, and education. At the same time, graduate enrollments have risen substantially, programs of graduate study have been extended to new fields and to new institutions, and programs of financial assistance and support for graduate education in the major academic and professional fields have been vastly augmented.

Despite the increased popularity and productivity of the nation's graduate schools, however, the demand for their products, particularly those with doctorate degrees, has continued to exceed the available supply. While there is lack of consensus among informed observers regarding the extent to which this imbalance between supply and demand is, or is likely to become "critical,"[1] current competition for highly educated individuals has given impetus to efforts directed toward increasing the supply (e.g., recruiting individuals to graduate study, developing more efficient and functional programs of graduate education, etc.).

In this context, many perennial problems of graduate education have been discussed and debated with renewed interest and an increased sense of urgency. Featured prominently in such discussions has been the length of time involved in doctoral preparation which has emerged as one of the major issues in graduate education (e.g., see Berelson, 1960 and Carmichael, 1961).

---

[1] For a discussion of different points of view regarding the supply-demand picture in the case of Ph.D. graduates, see Chase (1964) and Berelson (1960).

THE DURATION ISSUE

The issue of time and the doctorate does not derive directly from consideration of doctoral requirements, per se. The doctorate has developed as "a degree bestowed upon an individual for a particular and unique combination of abilities, demonstrated in a particular program of courses, examinations and research," (Rosenhaupt, 1958) and its requirements are not couched in terms of specific time units. Or, as Prior (1962) has put it, "The Ph.D. is an open-end degree; its final requirement is an independent investigation, and the presentation of results in acceptable form; [and] although practical considerations can and must act as a check on the duration of this exercise, it cannot be circumscribed by an exact, preordained time limit." Hence, no fixed amount of time is specified for doctoral preparation. Moreover, there is little debate regarding period of time during which it is "expected" that students, assuming sustained effort, should be able to complete all doctoral requirements—three to four calendar years in most fields. Primarily at issue is the amount of time taken *by* students en route to a doctorate and the way in which this time is distributed.

In more specific terms, interest in the length of time involved in doctoral preparation has derived mainly from consideration of (a) the total period of time during which individuals normally select, enter upon and complete the programs of studies, examinations and research which culminate in the award of the degree, namely, the interval between the baccalaureate and doctorate degrees and (b) characteristic patterns and rates of student progress toward the doctorate during this period.

In the first instance, reports of the National Academy of Sciences—National Research Council (e.g., NAS-NRC 1948, 1955, 1956 and, particularly, 1963) have called attention to the fact that the time lag between the baccalaureate and doctorate degrees (BA-PHD time lapse) is quite substantial in every field. During the period 1950-1959, for example, BA-PHD time lapse means for over 25 doctoral fields ranged from a low of about seven years in chemistry to a high of 15 years in Education, with means for broad academic areas as follows: physical sciences, 7 years; biological sciences, 8 years; social sciences, 10 years; arts and professional fields, 12 years (NAS-NRC, 1963). These studies have indicated not only substantial differences among the disciplines in BA-PHD time lapse, but also marked individual differences within every discipline.

As for patterns of progress toward the doctorate, not all the BA-PHD period is given over to graduate study or to work directly involved in securing the degree. In a recent national survey of graduate education, for example, doctoral graduates estimated that they spent, on the average, only about 3.2 years (median, all fields) "full-time equivalent, in work directly involved in securing the degree;" for arts and sciences graduates the average was slightly higher, namely, 3.5 years. (Berelson, 1960) These figures, of course, are small in relation to the time-lapse averages and they also closely approximate "expected" time expenditure. However, they represent an abstraction; the total amount of work "directly involved in securing the degree" may be distributed over varying periods of time—5, 7, 17 or even 27 years.

The fact that progress toward the degree need not conform to a fixed attendance pattern and time schedule is a distinctive feature of Ph.D. programs although certain patterns and time schedules may have developed as characteristic of certain fields. An individual may begin graduate work immediately after receiving the bachelor's degree or he may delay entry into graduate school; he may study full time or he may study part time; he may be in residence from the beginning of graduate study to conferral of the doctorate or he may be intermittently in and out of "residence" with periods of full-time professional employment intervening.

In some fields, the amount of time devoted to full-time employment during the predoctoral period may be substantially greater than the amount of time devoted directly to completion of degree requirements while in others the opposite may be true. To consider extreme cases only, recent data (NAS-NRC, 1963) on predoctoral *professional* employment experience in ten major fields reveal a median for all fields of 4.6 years (mean BA-PHD time lapse, all fields, was about 10 years), but field employment medians ranged from a low of 1.4 years in chemistry (with mean BA-PHD lapse of about 7 years) to a high of 12.5 years in Education (the field with the longest BA-PHD time lapse, namely 15 years).[2] While little was reported regarding the way in which the remaining time of these individuals during the predoctoral period was distributed, it is clear that time "in progress to the doctorate" is composed of varying mixtures of time devoted to work directly involved in completing degree requirements and time devoted to other activities, including professional employment.

---

[2] Medians for predoctoral professional employment by academic areas were as follows: physical sciences, 2.6 years; biological sciences, 3.4 years; social sciences, 4.6 years; arts and professions, 5.8 years. Data reported were for the period 1957-1961.

The Possibility of Expediting Doctoral Preparation

Generally speaking, then, attainment of the doctorate represents the culmination of a complex and rather loosely structured process carried out over relatively long periods of time (a) which vary in average duration from field to field, (b) the duration of which for a given individual cannot be specified in advance, and (c) during much of which an individual may be engaged in activities not directly related to the completion of degree requirements.

The possibility of reducing time taken to attain the doctorate —of expediting and "tightening" the loosely structured process of doctoral preparation in the major doctorate fields—has an obvious appeal during a period when doctoral graduates are in great demand. If the average time involved in "doctoral preparation" could be reduced, for example, it would be possible to confer more degrees during a given period of time. More expeditious completion of degree programs, it may be argued, is potentially desirable on other grounds as well. For example, earlier attainment of the degree would mean for the individuals involved, earlier establishment of "full professional status" and hold out the possibility of longer and more productive, *independent* scholarly and professional careers.[3]

However, notwithstanding the attractiveness of these and other putative outcomes of expediting and "tightening" the process of doctoral preparation, a number of questions remain at issue. Those who would consider the development of more structured and efficient approaches to preparation must deal with a number of basic questions such as the following:

---

[3] Degree candidates may "practice their professions" before obtaining the Ph.D. and a great many of them do so. However, the course of their career, much of their personal life, and both their attitudes toward and their status in "professional employment" prior to attainment of the doctorate may be influenced profoundly by their doctoral aspirations. This point has been made, for example, by Pressey (1949) in discussing the impact of a prolonged predoctoral period for the doctoral aspirant. Said Pressey, viewing the matter retrospectively, "over much of the [BA-PHD] period and perhaps all of it, [the degree recipient's] career was probably dominated by the purpose of securing a Ph.D.—financially, perhaps as to marriage and the family, and usually vocationally, since the positions he held prior to receiving the doctorate were regarded as temporary, and his final vocation was contingent upon his success in the graduate program." See also Pressey (1944 and 1962) and Wolfle (1964) for additional comments on the importance of expeditious completion of doctoral requirements from the point of view of enhancing the productivity and professional status of the individual.

> Can the process of doctoral preparation be expedited significantly within the framework of existing degree requirements without reducing the quality of preparation or altering the basic outcomes posited for Ph.D. programs? If so, to what extent, in which fields, and by what methods?
>
> To what extent are differences among the disciplines in characteristic patterns and rates of progress toward the doctorate a function of intrinsic differences among the disciplines in respect to the "rate of maturation" of scholars and scholarship, as opposed to differences in "customary or traditional practice," or other extrinsic factors (e.g., level of financial support, conditions of the market place, etc)?
>
> To what extent and in what ways is predoctoral professional employment experience relevant to the objectives of doctoral programs in the various disciplines?

There are, of course, many other equally relevant questions. Also at issue, generally speaking, is the question of giving *more specific form and structure* to a process which is basically open-ended, which stresses independent work and the development of individualized programs of study and research, which takes place in an atmosphere which is task- rather than time-oriented, and which traditionally has been characterized by a high degree of permissiveness in respect to both the pattern and the pace of student progress.

Starting from such a model, the problem for those who would seek to achieve a reduction in the amount of time taken by students to complete all requirements for the doctorate degree by developing more structured preparation programs is, in essence, how to escape the Charybdis of work's Parkinsonian expandability while avoiding the Scylla of Procrustean rigidity.

NEED FOR BASIC INFORMATION

Evaluation of these and other questions pertaining to the duration issue presupposes the availability of basic factual information about the patterning and duration of graduate study process as reflected in the behavior and circumstances of individuals during the predoctoral period. Yet, despite the current prominence of the duration issue and its recognized status as a "hardy perennial" in the field of graduate education,[4] there is actually a dearth of information about patterns and rates of student progress toward the doctorate in a variety of disciplines and in different institutional contexts. There have been relatively few normative analyses of the graduate study process designed to provide information about the study-patterns of students, their circumstances and problems during the graduate years, the amount of time they normally take to complete particular requirements, the amount of time they spend in residence, etc.; or studies designed to identify the personal and situational variables associated with "rate of progress to the doctorate" or other relevant criteria of student performance in doctoral study.

Data bearing most directly on one or another aspect of the duration issue have been generated during the course of a small number of significant studies, most of them recent, which have differed widely in scope and emphasis, including, for example, institutional studies such as those at Harvard (Elder, 1958) and Columbia (Rosenhaupt, 1958); national surveys of graduate work in particular disciplines such as those in economics (Bowen, 1953); history (Perkins and Snell, 1962); and Education (American Association of Colleges for Teacher Education, 1960); studies of graduate student finances such as that by Davis (1962); basic normative analyses of doctorate production and surveys of doctoral graduates by the National Academy of Sciences—National Research Council as previously cited; and, general studies and/or critical analyses of graduate education such as those by Carmichael (1961) and by Berelson (1960).

These studies, none of which has focused exclusively on the duration issue, have provided much useful information about the process of graduate study, including information about patterns and rates of student progress toward the doctorate in certain fields and institutions; they have called attention to the variety of personal and situational variables which may influence the course of doctoral preparation. They have also suggested something of the inherent complexity of the duration question, consideration of which must inevitably involve questions regarding the articulation of undergraduate and graduate study, the organization of graduate curricula, the financial support of graduate students, the preparation of college teachers, and the process of career development, to name only a few of the more immediately relevant considerations.

---

[4] Not, however, without some shift in the focus of concern over the years. The Federation of Graduate Clubs, for example, at its second annual meeting in 1901, recommended three years as the *minimum* time for the doctorate as a means of avoiding the "undesirable extremes of specialization." As compared to a lesser period of time, the three-year period would afford time for more extensive and broadening preparation, in the view of the Federation. (Association of American Universities, 1901, p. 46).

Insofar as they have been directly concerned with "duration," these studies have suggested not only the inherent complexity of the issue itself, but also the difficulties involved in basic description and analysis of "time spent in progress toward the doctorate." There is no established methodological and conceptual framework for assessing, measuring, or (more simply) for describing patterns and rates of progress toward the doctorate. Hence, problems of communicating, interpreting, and comparing "factual" data abound, even at the most elementary level—e.g., that of determining "how long it actually takes to get a doctorate."

In a much more general sense, these studies reflect a growing awareness among those most directly concerned with graduate education of the value of and the need for basic information about the enterprise of graduate education; information which can be derived only from systematic study and analysis of the problems and processes of graduate education at all levels from the departmental and institutional to the national. In this context, the need for basic information bearing on the issue of time and the doctorate must be given high priority.

A REGIONAL INQUIRY

The study reported herein reflects the mutual interest of the deans of Southern graduate schools and the Southern Regional Education Board in the duration issue and their recognition of the need for development of a broad, factual frame of reference within which to consider problems relating to the duration of doctoral study.[5]

---

[5] As used in this report, "south" is defined in terms of sixteen states which are parties to the Southern Regional Education Compact, namely, Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mis-

Basically normative in concept and design, the study was guided by several general objectives, as follows:

(1) to provide basic data on "time taken to attain the Ph.D." in a representative group of fields

(2) to obtain information about characteristic patterns of progress toward the doctorate in these fields and to identify factors affecting length of doctoral preparation period

(3) to obtain the opinions of doctoral graduates, graduate deans, and departmental representatives about ways in which time to attain the doctorate degree might be reduced within the framework of existing requirements.

Information relevant to these objectives was obtained primarily (a) from 1,929 graduates of selected doctoral programs in more than 20 Southern institutions who received a Ph.D. during the period 1950-1958 and (b) from 25 graduate deans and 100 representatives of academic departments (typically chairmen of departments whose graduates were selected for study at the respective institutions).

Information from graduates was obtained by means of a 12-page questionnaire (see Appendix A) designed to elicit a variety of information about their backgrounds and their predoctoral careers: e.g., attendance and employment patterns, timing of development of relevant educational goals, factors affecting the amount of time taken to complete doctoral requirements, patterns of financial support, etc.

Graduate deans and departmental representatives provided written responses to several general questions regarding the duration issue.

Scope of the Study and Basic Study Procedures

Identification of the sample. Selection of fields and institutions for the survey of graduates was guided by several practical considerations including (a) the need to obtain information from graduates in a representative group of doctoral fields, (b) a desire to limit the number of graduates which any institution would be asked to survey, and (c) the need to obtain a workable number of cases for analysis in each of the fields selected for study.

---

sissippi, North Carolina, South Carolina, Tennessee, Texas, Virginia and West Virginia.

The interest of the graduate deans was expressed formally through the Conference of Deans of Southern Graduate Schools.

Application of criteria consistent with these general considerations[6] and an arbitrary decision to exclude the large field of Education, led to the *tentative* identification of 15 fields which accounted for over 80 per cent of all doctorate degrees conferred by Southern institutions during the study period, after excluding from consideration the field of Education. These fields were as follows:

botany
microbiology
zoology
physiology
mathematics
physics
chemistry
engineering
psychology
sociology
political science
economics
history
foreign languages
English

Application of criteria involved in the identification of these fields and an arbitrary decision to restrict the study to institutions represented by two or more of the "eligible" doctoral fields resulted in the tentative inclusion of 24 doctoral institutions in an "original" institutional sample. Three of these institutions did not participate in the study and two institutions were subsequently added.

Thus, a total of 23 institutions agreed to participate in the survey of 1950-1958 doctoral graduates, in two or more of the doctoral fields tentatively selected for study, as follows:

Duke University
Emory University
Florida State University
George Peabody College For Teachers
Georgia Institute of Technology
Louisiana State University
North Carolina State College
Oklahoma State University
Texas A & M University
Texas Technological College
University of Arkansas
University of Delaware
University of Florida
University of Kentucky
University of Maryland
University of North Carolina
University of Oklahoma
University of Tennessee
University of Texas
University of Virginia
Vanderbilt University
Virginia Polytechnic Institute
West Virginia University

Various combinations of the "eligible" fields were tentatively designated for consideration by each participating institution with final selection of fields in the hands of the respective graduate deans.[7] Allowances for institutional preference and other circumstances resulted primarily in a substantial reduction in the number of physiology graduates surveyed and the introduction of a number of graduates whose field was "biology, general," a classification not originally considered for inclusion in the study.

---

[6] For example, fields in which all institutions in the region had conferred fewer than 100 Ph.D. degrees during the period 1950-1958 were not considered.

[7] The fields suggested for inclusion at an institution did not necessarily represent all the eligible fields at that institution. Thus, an institution which had conferred degrees in all these fields during the study period may have been asked to survey graduates in only five or six of the fields; and, in some departments where particularly large numbers of graduates were involved, only a

Summary data in Table 1.1 show, for the respective fields, the number of graduates in the region (all institutions) during the study period, the number originally selected for inclusion in the study (sample institutions only), the number retained after institutional adjustments (i.e., those actually included in the survey), the number who returned the basic questionnaire, and the corresponding response percentages.[8]

Data collection and analysis. In the survey of graduates, questionnaires were mailed by the respective graduate deans. Two follow-up inquiries were made. As indicated in Table 1.1, completed questionnaires were returned by 1,929 graduates, representing 71.2 per cent of the 2,709 distributed. Response rates were of this general order in every field.

The graduate dean at each participating institution also assumed primary responsibility for obtaining the responses of departmental representatives (typically, chairmen of the several departments whose graduates were included in the study at his institution) to several general questions about the duration issue, in addition to providing his own analysis of these questions. A total of 25 graduate deans and 100 departmental representatives participated in this aspect of the study.[9] Faculty representatives were distributed by broad academic areas as follows: physical sciences (46), biological sciences (22), social sciences (16), and humanities (16).

The basic study questionnaires were coded, and all basic tabulations of the resulting data were completed, in the Insti-

---

sampling of graduates was suggested. However, the graduate dean at each institution made the final decision regarding the particular departments (fields) to be included. In view of this latitude, and because field designations did not correspond in every instance to departmental designations (e.g., degrees in botany and zoology were reported not only from such departments, but also from Departments of General Biology, along with degrees in general biology, etc.) there were some changes in the originally selected departmental-field patterns in several institutions. However, the basic structure of the sample was not significantly altered by these changes.

[8] For a detailed enumeration of similar data by institution and by field (department) see Appendix A.

[9] Deans and faculty representatives were, in the main, from the institutions participating in the survey of graduates although representatives of other institutions accepted an invitation to participate. The sampling of departmental representatives was not systematic.

TABLE 1.1

Number of Graduates in the Study Sample in Relation to Total Number of Graduates in the Southern Region, By Field

Field	Total no. graduates in South, 1950-1958	Total tentatively selected for survey	Total finally included in questionnaire survey	Questionnaires returned	
				No.	%
Botany	177	124	124	96	77.4
Microbiology	168	121	113	85	75.2
Zoology	299	145	97	61	62.9
Physiology	105	90	24	19	79.2
Biology, general*	*	*	75	56(a)	74.7
Mathematics	320	181	171	131	76.6
Physics	570	235	172	119	69.2
Chemistry	1327	818	652	433(b)	66.6
Engineering	471	237	234	180(c)	76.9
Psychology	636	284	283	194	68.6
Sociology	159	132	131	101	77.1
Political Science	135	92	90	66	73.3
Economics	262	82	81	57	70.4
History	429	193	193	143	74.1
Foreign Languages	219	121	116	86	75.0
English	471	157	153	102	65.4
Total	5748**	3012**	2709	1929	71.2

* Not an originally designated field, although 75 questionnaires were distributed to graduates of Departments of General Biology.

** Totals do not include graduates from Departments of General Biology.

(a) Includes six cases subsequently classified as "zoology," five cases subsequently classified as "botany" and 45 cases for which the classification "biology, general" was retained.

(b) Includes 19 "biochemistry" graduates from Departments of Chemistry, subsequently grouped with "biology, general," and "physiology," to form a miscellaneous biosciences category.

(c) Includes five "engineering physics" majors subsequently classified for purposes of analysis as "physics" graduates.

tute for Social Research, Florida State University, under the direction of Dr. Charles M. Grigg, Director.

SOME FACTS ABOUT THE STUDY SAMPLE

The basic "field structure" of the study sample (N = 1,929) was essentially as shown in Table 1.1. However, relatively slight modifications already alluded to, resulted in the following classification of graduates for purposes of the study:

Field	N	Field	N
Biosciences	(336)	Social Sciences	(418)
Botany	101	Psychology	194
Microbiology	85	Sociology	101
Zoology	67	Political Science	66
Other Biosciences	83	Economics	57
Physical Sciences	(844)	Humanities	(331)
Mathematics	131	History	143
Physics	124	Foreign Languages	86
Chemistry	414	English	102
Engineering	175		

The institutional distribution of graduates within this basic field structure may be seen in Appendix A. It may be noted in passing that over 120 different departments were represented in the study sample. However, in many instances the number of cases involved was quite small, thus limiting possibilities for analysis of data by *department*.

Sex Distribution

The respondents were predominantly male; only about six per cent of the respondents were women though there was considerable variability among the fields in this regard (see Appendix A). About 24 per cent of the graduates in English, for example, and 21 per cent of those in foreign languages were women, with percentages ranging downward to the fields of engineering, economics, and zoology in which all the respondents were men.

Undergraduate Origins

A majority of the graduates had earned their bachelor's degrees in Southern institutions (61.4 per cent). However, this was true for almost three-fourths of the humanities graduates (73.8 per cent) but for somewhat smaller percentages of graduates in other major areas (between 57 and 60 per cent of biological, physical, and social science groups, respectively).

For about 61 per cent of the respondents, the bachelor's institution had been a complex university. About 30 per cent had attended more than one undergraduate institution, with 7 per cent reporting attendance at three or more institutions as an undergraduate.

Of all graduates, about 18 per cent earned the bachelor's and doctor's degrees at the same institution, but there was considerable variation by field, ranging downward from 40 per cent (engineering) to only 8 per cent (sociology).

Most of the graduates (69.7 per cent) completed their undergraduate work before 1950 and for 15 per cent the undergraduate program had been completed prior to 1940; 16.5 per cent of social science and 31.7 per cent of the humanities doctoral graduates reported pre-1940 baccalaureate degrees. A handful of hardy individuals (1.9 per cent of the total) reported their attendance as undergraduates had been completed prior to 1930. These figures presage trends in more detailed data on BA-PHD time lapse.

Type or Class of Employing Institution

More than one-half (54.0 per cent)of the respondents were employed by a *college or university. Industry or business,* the next largest employer, accounted for over 28 per cent, followed by the *federal government* with 12.0 per cent, and state or local government with 3.3 per cent (see Table 1.2). However, there was marked variation among fields in respect to these percentages. In certain fields (English, foreign languages, history, political science) 90 per cent or more of the graduates were employed by an educational institution or agency while in several others (chemistry, engineering, psychology, and physics) fewer than 40 per cent were so employed.

Regional retention of graduates. Some 36 per cent of the graduates were employed outside the Southern region, about 18 per cent in college or university service and a similar proportion in other types of employment (see Appendix A).

Of all graduates, 36 per cent were employed by a Southern college or university, with about 16 per cent in college service

TABLE 1.2

Distribution of Respondents According to Type or Class of Employing Institution or Agency, By Field

Field	N	Type of employing institution or agency*					
		College or university	Other educational agency	Federal gov't.	Other gov't.	Industry or business	Other and no response**
Biosciences	336	65.5		16.4	4.8	11.6	1.8
Botany	101	63.4		24.8	4.0	5.9	2.0
Microbiology	85	56.5		16.5	3.5	22.3	1.2
Zoology	67	70.2		13.4	8.9	7.5	0.0
Other	83	73.5		8.4	3.6	10.8	3.6
Phys. Sci.	844	33.2	0.1	12.4	0.6	53.2	0.6
Mathematics	131	68.7		12.2	0.8	17.6	0.8
Physics	124	38.7		29.0	1.6	30.6	0.0
Chemistry	414	23.7	0.2	8.2	0.5	66.9	0.5
Engineering	175	25.1		10.3	0.0	63.4	1.0
Soc. Sci.	418	57.9	2.9	15.6	9.6	13.2	1.0
Psychology	194	27.3	5.2	26.8	13.9	26.3	0.5
Sociology	101	83.2	1.0	3.0	8.9	2.0	2.0
Pol. Sci.	66	93.9	1.5	1.5	3.0	0.0	0.0
Economics	57	75.4		15.8	3.5	3.5	1.8
Humanities	331	90.3	2.1	2.4	0.6	1.2	3.3
History	143	88.8	3.5	4.2	1.4	0.7	1.4
F. Lang.	86	91.9	1.2	2.3	0.0	0.0	4.6
English	102	91.2	1.0	0.0	0.0	3.0	4.9
All Fields	1929	54.0	1.0	12.0	3.3	28.4	1.3

*Four individuals in military service are included under "Federal government" and twenty-two employed by private non-educational agencies or in private practice are included under "Industry or business." Of the latter group, sixteen were "Psychology" respondents.

**Includes self-employed, housewife, etc.

and about 20 per cent in university service. In several fields, however, less than 20 per cent of the doctoral graduates were employed in higher education in the South and in no field was the proportion so employed as great as 70 per cent. Thus, while 57 per cent of chemistry graduates were employed within the region, only 16 per cent were employed by a college or university and while almost two-thirds of the psychology graduates remained in the region, only 19 per cent were on the staff of a regional college or university.

Principal Duties Reported in Current Employment

At the time they completed the questionnaire (from one to ten years following conferral of the Ph.D.), about one-half of the graduates reported that their principal duties involved "research or research administration" or "teaching and research;" "teaching and/or academic administration" *only* accounted for about 36 per cent of the respondents (Table 1.3). Thus three basic duty-categories accounted for 86 per cent of the respondents.

However, the most striking feature of the data in Table 1.3 is the marked variability among fields in the nature of duties reported by graduates. Only 7 per cent of humanities graduates reported "research related" duties but more than 80 per cent reported "teaching and/or academic administration;" at the other extreme, only 19 per cent of physical science graduates reported "teaching and/or academic administration," while 69 per cent reported "research or research administration," alone, or in conjunction with teaching.

Judging from their own reports, the majority of graduates in certain fields were following careers devoted primarily to "teaching" (e.g., English, foreign languages, history, political science, and sociology), while in other fields graduates were following primarily "research oriented" careers (e.g., chemistry, engineering, physics, microbiology), with those in the remaining fields showing a greater balance between "teaching," "research," and other types of duties.

THE QUESTION OF REPRESENTATIVENESS

Procedures employed in identifying the study sample were influenced by a number of practical considerations not directly

TABLE 1.3

Classification of Respondents According to Principal Duties in Current Employment, By Field

Field	N	Research or research admin. %	Teaching and research %	Teaching and/or academic admin.* %	Other and no response** %
Biosciences	336	34.2	31.0	25.0	9.8
Botany	101	39.6	25.7	23.8	10.9
Microbiology	85	45.9	32.9	9.4	11.8
Zoology	67	29.9	26.9	38.8	4.5
Other	83	19.3	38.6	31.3	10.8
Physical Sciences	844	59.4	9.6	19.0	12.1
Mathematics	131	21.4	15.2	48.1	15.3
Physics	124	65.3	18.5	11.3	4.8
Chemistry	414	73.9	6.3	13.0	6.9
Engineering	175	49.1	6.8	17.1	27.0
Social Sciences	418	18.7	17.7	38.3	25.4
Psychology	194	28.9	9.8	16.5	44.8***
Sociology	101	13.9	23.8	55.4	6.9
Pol. Science	66	3.0	18.2	72.7	6.1
Economics	57	10.5	33.3	42.1	14.0
Humanities	331	2.1	5.4	85.8	6.6
History	143	4.9	6.3	83.2	5.6
F. Lang.	86	0.0	4.6	87.2	8.1
English	102	0.0	4.9	88.2	6.9
Total	1929	36.3	14.4	35.7	15.6

*Includes individuals reporting duties involving student advisement and counseling as well as those reporting primarily administrative duties at departmental, divisional, and institutional levels, respectively.

**Includes general administration, self-employment not elsewhere classified, military service, clinical practice, etc. Principal criterion is absence of teaching, research, academic administration or research administration as a principal duty.

***Includes 58 individuals reporting primarily clinical duties.

designed to effect "randomness" or proportionality in terms of regional distributions of graduates by field, by institution, or other specified factors. However, evidence is available which permits the general conclusion that the procedures employed yielded samples in the respective fields which, with respect to at least one of the major elements of the problem under consideration, viz., BA-PHD time lapse, appear to be (a) quite representative of all regional graduates in the respective fields and (b) generally representative of graduates in these fields nationally.

Special tabulations by fields of BA-PHD time lapse for essentially all graduates of Southern doctoral institutions during the period 1950-1956, provided by the Office of Scientific Personnel of the National Research Council, and published NRC national data on BA-PHD time lapse provide a basis for comparison with the study sample, as shown in Table 1.4.

The impression conveyed by the comparative data on mean BA-PHD time lapse is one of general similarity (a) between data for the study sample and data for all graduates in the region and (b) between data for the study sample and data for graduates nationally.[10] Discrepancies in averages for the respective groups are relatively modest in most instances.

Study sample averages in English and political science are somewhat higher than the comparable "all region" averages while the opposite is true in the case of engineering. Generally speaking, however, the similarities are more conspicuous than the differences, particularly in respect to general order of magnitude of study sample and "all region" time lapse averages.

---

[10] See Appendix B for a more detailed presentation of data bearing on this matter.

TABLE 1.4

BA-PHD Time Lapse in Selected Fields: Data for Study Sample, 1950-58, Versus Data for All Southern Graduates, 1950-56, and All Graduates in the Nation, 1950-59

	Mean BA-PHD lapse (years)		
Field	All graduates, Southern region 1950-1956[a]	Study sample, Southern region 1950-1958	All graduates, United States 1950-1959[b]
Botany	8.7	8.8	7.9
Microbiology	8.4	8.2	8.1
Zoology	8.9	9.1	8.4
Other biosciences	8.0	8.2	8.2
Mathematics	10.1	10.4	8.3
Physics	8.1	8.6	7.4
Chemistry	7.1	7.2	6.6
Engineering	8.9	7.8	8.1
Psychology	7.8	7.4	8.5
Sociology	11.2	10.8	11.3
Political Science	9.8	10.9	10.5
Economics	10.5	11.3	10.5
History	11.4	11.1	11.8
Foreign Languages	12.1	12.0	12.6
English	13.0	14.1	12.0

[a] Based on special tabulations of data collected by the National Research Council for all graduates of Southern institutions during the period 1950-1956.

[b] Reported in NAS-NRC Publication 1142, 1963, pp. 20-21.

CHAPTER II

Time Taken To Attain The Doctorate

For the typical[1] graduate in the study sample, conferral of the Ph.D. came 7.5 years after conferral of the baccalaureate degree and 6.1 years after entry into graduate school. Like the majority of his confreres (87 per cent) he had earned a master's degree en route to the doctorate and par for the master's-to-doctorate (MA-PHD) course was 4.5 years.

During the predoctoral (BA-PHD) period the average graduate was "in attendance" at a graduate institution for a total of more than 16 academic quarters (4.2 calendar years), 14 of which (3.5 calendar years) were completed at the doctoral institution.

Like almost 80 per cent of his colleagues he had completed some full-time employment during the predoctoral period, mostly in some form of professional work—either in college teaching or other professional categories. Total time in employment (including military service and nonprofessional work but specifically excluding work in graduate assistantships or other similar appointments) was, on the average, 3.2 years.

At time of degree conferral the average individual in the sample was 30.8 years of age.

While this general profile would not be perceived as "typical" by the average graduate in a field such as English (who received the Ph.D. at the age of 35 years, 13 years following the bachelor's degree and almost 10 years after entering a graduate program) or chemistry (only 28 years of age at time of degree conferral, 6 years following college graduation and 5 years after entering graduate school) it does serve to point up several variables of major importance in the assessment of the "duration of doctoral study," namely,

---

[1] Unless otherwise indicated, in discussions of typical or average values, the median is the intended reference.

(1) *time lapse*—from the bachelor's degree, from time of entry into graduate school, and (for the majority of individuals) from time of conferral of the master's degree

(2) *graduate attendance*—total years of attendance at a graduate institution and years of attendance at the doctoral institution

(3) *predoctoral employment*—years employed, full-time or full-time equivalent, and general categories of employment during the BA-PHD period, exclusive of time devoted to graduate appointments

(4) *age of graduates* at time of degree conferral.

The data presented in this chapter constitute a general normative frame of reference with respect to these variables.[2]

ELAPSED-TIME INDICES OF DURATION

As already noted, programs of study leading to the doctorate are not defined in terms of "time units" or "course units." Accordingly, important questions regarding the "duration of doctoral study" relate to the amount of time ordinarily taken by individuals in completing the specific programs of studies, examinations and research which culminate in award of the degree, or to the time span during which these programs (or selected facets of these programs) normally are undertaken and completed.

The most general index of duration is the time span from the baccalaureate to the doctorate degree (BA-PHD time lapse); the time span between entry into graduate school and conferral of the doctorate (entry-PHD time lapse) constitutes a second important index of duration; and since, traditionally, graduate students take a master's degree in a "stepping stone" approach to the doctorate, duration of the post-master's (MA-PHD) as well as the pre-master's (BA-MA and entry-MA) periods must be considered quite important in any assessment of time taken to attain the doctorate.

---

[2] Graduates reported beginning and terminal dates of attendance at each higher institution attended; dates of conferral of all degrees earned, including year and month; graduate attendance in semesters and/or quarters; date of birth; and years of employment during the predoctoral period in each of several designated categories. For each individual who provided the necessary information, dates of degree conferral (i.e. year and month) were coded in years and tenths, as were data on date of birth. The respective time lapse indices and age at degree conferral were derived independently. Attendance data were converted into calendar-year equivalent.

Shown in Table 2.1 are averages for two time lapse indices, viz., BA-PHD time lapse and entry-PHD time lapse, by field; more detail regarding these two time lapse distributions is provided in Table 2.2[3].

It is clear that, on the average, science graduates (except in the field of mathematics) spent less time en route to the doctorate by both these measures than graduates in social sciences and humanities (except in the field of psychology); elapsed time is least for physical science graduates and greatest for humanities graduates. As noted, exceptions are represented in the fields of psychology and mathematics, the former being similar to science fields in terms of elapsed time and the latter being similar to the social science fields.[4]

Excluding psychology, BA-PHD time lapse medians in the social sciences and the humanities ranged from about 9 years (sociology) to almost 13 years (English); entry-PHD medians ranged from about 7 years (sociology and political science) to almost 10 years (English and foreign languages).

In the natural sciences, BA-PHD medians ranged from 6 to 8 years and entry-PHD medians from 5 to 7 years (except in the field of mathematics). Chemistry graduates spent least time en route to the doctorate by either measure.

The more detailed distributions shown in Table 2.2 point up the variability among individuals within each field as well as among the various fields with respect to both these measures of duration. For example, for 25 per cent of the recent graduates,

---

[3] BA-PHD time lapse data include time spent in military service during the predoctoral period. There are differences among the fields in respect to incidence and duration of military service. However, adjustment of the BA-PHD time lapse means for the respective fields in terms of mean years of military service reported (Table 2.8) leaves essentially unaltered the rank order of the respective fields. The correlation between actual and "adjusted" means is very high (rho = .992).

[4] In respect to the majority of variables under consideration in this inquiry, data for the field of psychology tend to be similar to data for the physical science fields whereas data for mathematics tend to be similar to data for social science fields. Thus, in most summary statistics, distinctions between the physical sciences and the social sciences are to some extent attenuated by the "deviant" behavior of these two disciplines.

TABLE 2.1

BA-PHD and Entry-PHD Time Lapse Data, By Field of Study

Field	BA-PHD time lapse (years)			Entry-PHD time lapse (years)		
	N	Mean*	Median	N	Mean	Median
Biosciences	325	8.6	7.2	314	7.2	5.8
Botany	96	8.8	7.2	94	7.0	5.3
Microbiology	80	8.2	6.8	75	6.8	5.7
Zoology	67	9.1	8.1	65	8.3	6.8
Other Biosciences	82	8.2	7.2	80	6.8	5.9
Physical Sciences	815	8.0	6.7	792	6.7	5.4
Mathematics	124	10.4	8.9	122	9.0	7.8
Physics	122	8.6	7.6	117	7.6	6.8
Chemistry	398	7.2	6.0	390	6.0	5.0
Engineering	171	7.8	6.6	163	6.0	4.9
Social Sciences	403	9.3	7.7	396	7.7	6.4
Psychology	190	7.4	6.4	187	6.4	5.6
Sociology	95	10.8	8.9	97	9.0	7.4
Political Science	63	10.9	9.8	57	8.2	7.1
Economics	55	11.3	9.9	55	9.3	8.5
Humanities	322	12.7	11.2	312	10.4	9.0
History	142	11.8	9.9	137	9.7	8.0
Foreign Languages	81	12.6	11.1	81	10.6	9.6
English	99	14.1	12.6	94	11.3	9.7
All Fields	1865	9.2	7.5	1814	7.6	6.1

*All measures of central tendency based on the total number of cases for which adequate data were available.

TABLE 2.2

Selected Percentile Points in Bachelor's-to-Doctorate and Entry-to-Doctorate Time Lapse Distributions, By Field

Field	Time lapse in years							
	BA-PHD			Entry-PHD				
	Percentile ranks*			Percentile ranks				
	P_{25}	P_{50}	P_{75}	P_{10}	P_{25}	P_{50}	P_{75}	P_{90}
Biosciences	5.4	7.2	10.0	3.7	4.6	5.8	8.4	12.8
Botany	5.1	7.2	10.5	3.5	4.2	5.3	7.9	10.7
Microbiology	5.2	6.8	10.0	3.8	4.6	5.7	8.3	12.8
Zoology	5.6	8.1	10.4	4.4	5.3	6.8	9.9	13.2
Other	5.6	7.2	9.2	3.6	4.6	5.9	7.7	12.5
Physical Sciences	4.9	6.7	9.9	3.4	4.2	5.4	8.1	11.6
Mathematics	5.8	8.9	14.0	3.8	4.7	7.8	11.2	17.4
Physics	5.8	7.6	10.6	4.2	5.2	6.8	9.2	11.6
Chemistry	4.5	6.0	8.5	3.4	4.1	5.0	6.6	10.7
Engineering	4.7	6.6	9.7	3.2	3.8	4.9	7.2	10.9
Social Sciences	5.8	7.7	11.0	4.2	4.9	6.4	9.4	13.3
Psychology	5.2	6.4	8.5	3.8	4.5	5.6	7.4	9.7
Sociology	6.3	8.9	13.4	4.2	5.2	7.4	11.4	16.8
Political Science	6.8	9.8	13.0	4.3	5.3	7.1	9.8	13.3
Economics	7.0	9.9	15.1	4.9	6.0	8.5	11.4	15.5
Humanities	7.4	11.2	16.5	4.7	6.1	9.0	13.6	18.7
History	7.0	9.9	15.9	4.7	5.7	8.0	12.5	17.8
F. Lang.	7.8	11.1	16.2	4.7	5.8	9.6	13.4	18.9
English	8.2	12.6	18.1	5.4	7.2	9.7	14.6	20.6
All Fields	5.4	7.5	11.3	3.7	4.6	6.1	9.2	13.9

*Entries indicate number of years after the bachelor's degree (or after matriculation) within which designated percentages of graduates earned the doctorate. For example, for 25 per cent of bioscience graduates BA-PHD time lapse was less than 5.4 years and the entry-PHD interval was less than 4.6 years, etc.

the BA-PHD period was longer than 11 years and for an equal proportion it was less than 6 years. Generally speaking, within-field variability increases, over fields, with average time lapse.

Differences among the fields are quite evident. Only about one-fourth of natural science graduates, for example, spent more than 10 years en route to the Ph.D. (BA-PHD) while in five of the remaining fields, *median* BA-PHD values were of this magnitude. To cite extremes, in terms of entry-PHD time lapse, the "fastest" fourth in the field of English attained the Ph.D. in less than 7 years but more than three-fourths of chemistry graduates did so.

Of all graduates, the "fastest" 25 per cent attained the doctorate within 5.4 years following the bachelor's degree or, according to the entry-PHD measure, 4.6 years after entry into graduate school. For an equal proportion, however, comparable values were 11.3 and 9.2 years, respectively.

The evidence indicates that very few individuals entered upon and completed a program of studies leading to the Ph.D. within four calendar years; the 10th percentile in the entry-PHD distribution was 3.7 years. More precisely, tabulations not reported in detail indicate that only 14 per cent of the sample earned the degree within 4.0 years—5 per cent in the humanities, 8 per cent in the social sciences, 14 per cent in the biological sciences, and 20 per cent in the physical sciences earned the doctorate within 4 years after entering graduate school.

Generally speaking, by far the most striking feature of the time lapse data which have been reviewed here, aside from the absolute magnitude of the averages, is the substantial variability—among fields and among individuals. By way of contrast, data (not tabled) on time lapse between entry into undergraduate work and completion of the baccalaureate degree (entry-BA) reveal variability among individuals but remarkably little variation among the fields in *average* time spent in progress to the degree. In the total sample, median time lapse (entry-BA) was 3.8 years; in 12 of the 15 fields, medians did not vary from this figure by more than one-tenth of a year and the greatest deviation was only three-tenths.

Thus, the structured character of undergraduate programs is reflected in relatively uniform time-lapse averages. In a similar way, the comparatively structured nature of master's degree programs is reflected in certain of the time lapse data considered in the following section.

For most recipients of the doctorate, the Ph.D. is the second graduate degree and the predoctoral period can be thought of as having two major phases, namely pre-master's and post-master's. Shown in Table 2.3 are data on duration of the pre- and post-master's phases of the predoctoral period, by field.

Almost 87 per cent of the group took a master's degree, with figures ranging from 100 per cent in English to 79 per cent in chemistry. Inspection of the data reveals very little variation among fields in respect to duration of the *pre*-master's phase of the predoctoral period. The median entry-to-master's (entry-MA) time interval for the entire sample was 1.7 years with a range of only four-tenths of a calendar year in the medians over fields. And, while bachelor's-to-master's (BA-MA) medians for humanities fields are somewhat elevated, there is comparatively little variation of field medians around the total sample median of 3.7 years.

It is, in fact, in respect to duration of the *post*-master's phase of the predoctoral period that major differences among the fields become apparent; field medians for MA-PHD time lapse range from slightly over three years to just under eight years, around a total sample median of 4.5 years.

In passing it may be noted that mean BA-PHD time lapse was lower for the minority who did not take a master's degree than for the majority who did.

GRADUATE ATTENDANCE

The average years of graduate attendance shown in Table 2.4 reflect a conversion into calendar years of the number of quarters, semesters, and summer sessions during which respondents reported that they were in attendance at a graduate institution. These figures include *both full- and part-time attendance* and they should not be thought of as representing continuous attendance.

While the term "in attendance" is not completely unambiguous, the attendance data are of considerable significance. It should be kept in mind that if attendance were continuous, and if all requirements for the doctorate were completed during the period of graduate attendance then these averages would reflect directly the "duration of doctoral study," from entry to degree

TABLE 2.3

Duration of Pre- and Post-Master's Phases of the Predoctoral Period, by Field

Field	Per cent with master's	Elapsed time in years					
		BA-MA		Entry-MA		MA-PHD	
		Mean	Median	Mean	Median	Mean	Median
Biosciences	89.3	3.6	2.7	2.3	1.8	5.4	4.1
Botany	91.1	4.0	2.8	2.3	1.8	5.4	3.7
Microbiology	94.1	3.3	2.6	2.0	1.7	4.9	3.7
Zoology	89.6	3.4	2.5	2.5	1.8	6.2	5.0
Other	81.9	3.7	2.9	2.4	2.0	5.2	4.3
Phys. Sci.	82.3	3.4	2.6	2.4	1.7	5.0	3.8
Mathematics	85.5	3.7	2.8	2.6	1.9	7.0	5.7
Physics	82.2	3.4	2.6	2.3	1.8	5.7	5.0
Chemistry	79.2	3.2	2.5	2.1	1.8	4.4	3.4
Engineering	87.4	3.5	2.5	1.8	1.6	4.4	3.4
Social Sciences	87.1	3.5	2.3	2.2	1.7	5.8	4.6
Psychology	80.9	2.9	2.1	2.0	1.7	4.6	4.0
Sociology	96.0	3.8	2.5	2.5	1.7	6.5	5.4
Pol. Sci.	90.9	4.1	3.2	2.1	1.8	6.7	5.5
Economics	87.7	4.1	2.2	2.3	1.6	7.0	5.6
Humanities	95.2	4.7	3.0	2.5	1.7	8.2	6.7
History	97.2	4.2	2.8	2.4	1.7	7.8	6.2
F. Lang.	86.0	3.9	2.5	2.1	1.7	9.0	7.7
English	100.0	5.9	4.2	3.0	1.8	8.3	6.7
All Fields	86.8	3.7	2.9	2.4	1.7	5.9	4.5

TABLE 2.4

Average Years of Graduate Attendance, By Field of Study

Field	Graduate attendance (years)*					
	All Graduate Institutions				Doctoral institution only	
	Mean	(P_{25})	Mdn	(P_{75})	Mean	Median
Biosciences	4.7	(3.5)	4.4	(5.2)	3.7	3.6
Botany	4.4		4.2		3.5	3.4
Microbiology	4.7		4.5		3.9	3.5
Zoology	4.7		4.6		3.6	3.5
Other Biosciences	4.9		4.6		4.0	3.8
Physical Sciences	4.5	(3.7)	4.3	(5.2)	3.8	3.7
Mathematics	4.8		4.4		3.7	3.2
Physics	4.9		4.7		3.9	3.8
Chemistry	4.5		4.3		3.9	3.7
Engineering	4.2		4.0		3.7	3.4
Social Sciences	4.1	(3.2)	3.8	(4.7)	3.2	3.1
Psychology	4.1		3.8		3.3	3.2
Sociology	3.9		3.8		2.9	3.0
Political Science	4.3		4.0		3.5	3.1
Economics	4.0		3.7		3.1	3.0
Humanities	4.2	(3.2)	3.9	(4.8)	3.3	3.2
History	4.0		3.8		3.3	3.2
F. Lang.	4.4		4.3		3.4	3.4
English	4.2		3.9		3.7	3.1
All Fields	4.4	(3.4)	4.2	(5.0)	3.6	3.5

*Reported as number of semesters and/or quarters of "attendance at a graduate institution" and converted into calendar-year equivalent. Includes both full- and part-time attendance and does not necessarily represent *continuous* attendance. In parentheses are the 25th and 75th percentiles, respectively, in distributions of total years of attendance, all graduate institutions for the major areas and the total sample of this, for example, 25 per cent of biosciences graduates spent less than 3.5 years in attendance and 25 per cent spent more than 5.2 years in attendance.

conferral. As we have already seen, however, these conditions do not obtain.

It is clear that a substantial majority of individuals in all fields spent considerably more than the oft-cited "minimum" of three academic years in attendance at a graduate institution. Median total attendance was slightly over four years; one-fourth of the sample reported less than 3.4 years while a similar proportion reported 5.0 years or more. Median for attendance at the doctoral institution was 3.5 years.

Fields differ less with respect to average years of graduate attendance than with respect to elapsed time. For the fields, medians for total attendance ranged from slightly less than four to slightly less than five calendar years, and medians for attendance at the doctoral institution from three to almost four years. Natural science means (total attendance) ranged from 4.2 to 4.9, others from 3.9 to 4.4 years.

While differences among the fields in respect to average years of graduate attendance are not great, it is clear that in the fields of longer duration (BA-PHD or entry-PHD), medians for years of attendance, both total and at the doctoral institution, tend to be lower than in fields of shorter duration. Thus, over fields, there is some tendency for average time en route to the doctorate to increase as average time actually in attendance decreases; less time in attendance means more "unfinished business" to be taken care of "off-campus." However, as we shall see in a subsequent section of this report, this type of relationship between attendance time and time lapse *does not obtain among individuals* within a field.

The attendance data conceal certain important aspects of attendance patterns, including two that are considered in the following section, namely, full- versus part-time attendance and attendance during summer sessions.

General Attendance Patterns

Shown in Table 2.5 are data on full- and part-time attendance and attendance during summer sessions, which suggest (a) that the graduate programs of these individuals were not their primary responsibility during all periods of graduate attendance and (b) that the pattern of utilization of summer sessions varied considerably among the fields.

In the total sample, the mean of 1.4 years, part-time attend-

TABLE 2.5

General Attendance Patterns: Full-time, Part-time, and Summers, By Field

Field	Mean years of attendance, all schools			Number of summer sessions attended (in per cent)		
	Total	Full-time*	Part-time*	Less than 3	3-5	6 plus
Biosciences	4.7	3.3	1.4	27.4	56.5	16.1
Botany	4.4	3.2	1.2	31.7	57.4	10.9
Microbiology	4.7	3.6	1.1	23.5	56.5	20.0
Zoology	4.7	3.3	1.4	35.8	52.2	11.9
Other Biosciences	4.9	3.3	1.6	19.3	59.0	21.7
Physical Sciences	4.5	3.0	1.5	27.0	61.7	11.3
Mathematics	4.8	2.8	2.0	37.4	45.0	17.6
Physics	4.9	2.8	2.1	41.1	49.2	9.7
Chemistry	4.5	3.2	1.3	20.0	70.3	9.7
Engineering	4.2	2.8	1.4	25.7	62.8	11.4
Social Sciences	4.1	3.0	1.1	46.7	42.5	10.8
Psychology	4.1	3.0	1.1	46.9	46.9	6.2
Sociology	3.9	2.9	1.0	45.5	41.6	12.9
Political Science	4.3	3.3	1.0	43.9	42.4	13.6
Economics	4.0	2.9	1.1	50.9	29.8	19.3
Humanities	4.2	2.8	1.4	40.8	39.3	19.9
History	4.0	2.9	1.1	40.6	40.6	18.9
Foreign Languages	4.4	2.9	1.5	43.0	40.7	16.3
English	4.2	2.5	1.7	29.3	36.2	24.5
All Fields	4.4	3.0	1.4	33.7	52.8	13.5

*Respondents reported the number of semesters, quarters, and/or summer sessions, respectively, of graduate attendance (total, full-time, part-time), with the following instruction: "In differentiating 'full-time' and 'part-time' attendance, consider a quarter, semester, or summer session as 'full-time' if during the term your graduate program constituted your *primary* responsibility." (See basic questionnaire, Appendix A).

ance, is roughly one-third the mean of 4.4 years, total attendance. For social sciences and humanities fields, means (part-time) ranged from 1.0 to 1.7 years while for natural sciences, means ranged from 1.1 to 2.1 years. Of interest are the relatively high part-time means for mathematics and physics graduates.

Means for full-time attendance tend to follow the pattern, over fields, established for total attendance means, namely, more full-time attendance tends to be associated with lower mean BA-PHD time lapse, but the relationship is slight (rho = —.33). When mean full-time attendance for each field is expressed *as a proportion of mean total attendance* the relationship with mean BA-PHD time lapse over fields approaches zero (rho = —.08). Actually, in the majority of fields, the mean for part-time attendance is less than one-third the magnitude of the total attendance mean.

Slightly over one-half (52.8 per cent) of the total sample were in attendance during three to five summer sessions, inclusive; about one-third (33.7 per cent) attended less than three summers while slightly more than one-eighth (13.5 per cent) attended more than six. Several trends are of interest in these data.

(1) Generally speaking, in fields of longer duration (BA-PHD), summer quarters tended to be "under-utilized" (as reflected in the percentage of graduates attending less than three summers) but in some instances they also tended to be "over-utilized" (six or more summer sessions), suggesting a "stretch-out" of attendance.

(2) The modal interval for natural science graduates, generally, was "3-5" sessions, while for social sciences and humanities graduates, generally, the modal interval was "less than 3 summers."

(3) Confirming impressions gained by inspection of the data, a strong inverse relationship (rho = —.89) obtains between the rank order of the fields in total duration (mean BA-PHD time lapse) and rank order of the fields in respect to the percentage of graduates attending three to five summer sessions. Thus, the greater the average time lapse in a field, the smaller the percentage of graduates attending 3, 4, or 5 summer sessions. Without attributing any special qualities to these numbers, we may infer that in the case of fields of shorter total duration (BA-PHD) this number of summer sessions tended to be part of a relatively compactly organized study pattern whereas in

the fields of longer total duration, summer sessions tended either not to be utilized adequately (perhaps time was needed for some form of remunerative employment, for example) or to be utilized as part of a more extended, less compactly arranged program of graduate study.

PREDOCTORAL EMPLOYMENT PATTERNS

Examination of the time lapse and attendance averages indicates that years of graduate attendance represent a considerably greater proportion of the predoctoral period for the science fields than for the social sciences and the humanities, generally speaking, a fact which is directly reflected in data on predoctoral employment.

Respondents were asked to report years of employment *during the predoctoral (BA-PHD) period only* in (a) college teaching and/or administration, (b) other teaching and/or administration, (c) other professional positions, (d) military service, and (e) non-professional activities. Relevant information regarding the incidence, nature and average years of employment during the predoctoral period, by field, is provided in Tables 2.6, 2.7, and 2.8.

The majority of individuals in every field (see Table 2.6) reported some full-time employment. The incidence of predoctoral employment, however, was substantially greater for some fields than for others, ranging from a high of 95 per cent of English graduates to a low of roughly 63 per cent of chemistry graduates. As expected, incidence of predoctoral employment tends to vary directly, over fields, with average duration (BA-PHD). Of greater interest is the direct relationship over fields between average time lapse and the percentage of graduates who reported college or other teaching experience; e.g., roughly seven-tenths of the humanities graduates reported college teaching experience and four out of ten were employed in other types of teaching situations as compared to only about one-third of the natural science graduates in college teaching and less than one-tenth in other teaching.

As indicated in Table 2.7 for the entire sample, about one-half the total man-years of predoctoral employment could be accounted for by some form of teaching and/or academic or educational administration. In seven of the 15 fields, however,

TABLE 2.6

Per Cent of Respondents, By Field of Study, Reporting Designated Types of Employment During the Predoctoral Period*

Field	N	Type of predoctoral employment experience (Per cent reporting)					
		None	College teaching	Other teaching	Other professional	Military service	Non-professional
Biosciences	336	26.5	32.4	11.6	38.7	25.0	13.7
Botany	101	30.7	24.8	18.8	33.7	26.7	13.9
Micro.	85	25.9	24.7	5.9	49.4	30.6	11.8
Zoology	67	22.4	53.7	13.4	31.3	17.9	19.4
Other	83	25.3	32.5	7.2	39.8	22.9	10.8
Phys. Sci.	844	27.6	34.7	7.6	44.4	24.4	7.5
Math.	131	15.3	64.9	22.1	34.4	27.5	13.0
Physics	124	17.7	35.4	5.6	61.3	19.4	7.3
Chemistry	414	36.7	25.1	5.3	38.9	21.8	6.3
Engin.	175	22.3	34.3	3.4	53.1	32.0	6.3
Soc. Sci.	418	15.3	44.0	13.6	49.0	29.2	16.3
Psych.	194	18.0	23.7	10.8	60.3	24.2	14.4
Sociology	101	15.8	63.4	18.8	44.6	27.8	19.8
Pol. Sci.	66	10.6	65.2	13.6	21.2	34.9	18.2
Econ.	57	10.5	54.4	14.0	50.9	42.1	14.0
Humanities	331	9.4	70.4	40.8	18.4	39.3	20.5
History	143	11.2	66.4	39.2	21.0	44.1	21.9
F. Lang.	86	11.6	74.4	31.4	16.3	33.7	14.0
English	102	4.9	72.5	51.0	16.7	37.3	24.5
All Fields	1929	21.6	42.5	15.3	40.0	28.1	12.7

*Respondents were asked to report years of employment (full-time or full-time equivalent), *exclusive of graduate appointments,* during the predoctoral (BA-PHD) period *only*. Row totals exceed 100 per cent due to the inclusion of individuals in more than one employment category.

TABLE 2.7

Distribution of Total Years of Employment During The BA-PHD Interval According to Type, By Field of Study

Field	Per cent of total years of employment by type					
	Teaching &/or administration			Other prof.	Military service	Non-professional
	College	Other	Total			
Biosciences	30.9	10.3	(41.2)	31.6	21.5	5.6
Botany	20.7	19.1	(39.8)	31.0	22.9	6.2
Microbiology	21.6	2.2	(23.8)	44.1	28.2	3.8
Zoology	51.9	9.6	(61.5)	22.2	9.6	6.7
Other	30.9	7.4	(38.3)	30.2	26.0	5.5
Physical Science	32.5	6.6	(39.1)	41.0	16.3	3.6
Mathematics	52.7	13.5	(66.2)	15.4	12.7	5.8
Physics	22.8	3.5	(26.3)	62.3	8.7	2.7
Chemistry	21.9	6.0	(27.9)	48.2	20.7	3.2
Engineering	35.2	2.5	(37.7)	40.5	19.4	2.3
Social Sciences	35.2	11.8	(47.0)	27.5	18.7	6.8
Psychology	19.9	9.0	(28.9)	42.7	20.3	8.1
Sociology	40.6	17.0	(57.6)	21.4	14.5	6.4
Political Science	49.9	8.3	(58.1)	14.0	20.3	7.4
Economics	39.4	11.2	(50.6)	23.4	21.4	4.5
Humanities	44.8	23.2	(68.0)	8.4	16.3	7.3
History	43.6	19.5	(63.1)	10.4	17.5	9.0
F. Lang.	53.3	14.6	(67.9)	9.6	17.8	4.7
English	40.7	33.3	(74.0)	5.1	13.9	7.0
All Fields	36.3	12.9	(49.2)	27.5	17.6	5.6

well under 50 per cent of all time in predoctoral employment could be so accounted for—*these were the seven fields of shorter duration (BA-PHD).* In the eight other fields, namely, those of greater duration, from 50 per cent to almost 75 per cent of time in employment was in teaching.

In Table 2.8, we find for the entire sample a mean of almost two years in college teaching, about a year and a half in other professional employment, less than a year in military service, "other teaching," and non-professional employment, respectively. Variation among the fields, of course, follows that shown in Table 2.7—high proportion of total years of predoctoral employment in teaching is associated with greater average duration (BA-PHD or entry-PHD).

Of some interest is the fact that although proportionately more social science and humanities graduates reported some military service during the predoctoral period and spent, on the average, more years in service, years in service actually accounted for a greater share of total predoctoral employment reported among bioscience graduates than among social science and humanities graduates.

Time in Attendance versus Time in Employment

We have considered separately the two major components of the predoctoral period, namely, time in attendance and time in employment. In the experience of doctoral candidates, however, these two components sometimes "merge." Although no data are available on the extent of overlap between employment (not related to the graduate program) and periods of "graduate attendance," in ten of the fifteen fields, the sum of "mean years of predoctoral employment" and "mean years of graduate attendance" exceeds in magnitude the mean BA-PHD time lapse, although the discrepancy is relatively modest in most fields. Only in mathematics and physics is there indication of relatively substantial overlap between periods of employment and periods of, presumably, part-time attendance. Graduates in these fields, it will be recalled from Table 2.5, reported the greatest amount of part-time attendance (about 2 years). Not accounted for by either the attendance or the employment categories involved in the study are, of course, periods of nonattendance during which respondents may have been unemployed, actually or technically (e.g., summer vacations, status as "housewife" for women respondents, etc.). Accordingly, in some fields employment plus

TABLE 2.8

Mean Years of Employment in Designated Areas During the Predoctoral Period, By Field of Study

	Type of predoctoral employment (mean years)						
Field	College teaching	Other teaching	Other professional	Military service	Non professional	Total	
Biosciences	1.3	0.4	1.3	0.9	0.2	4.1	(2.5)*
Botany	0.9	0.8	1.3	1.0	0.3	4.2	(2.4)
Microbiology	0.8	0.1	1.6	1.0	0.1	3.7	(2.4)
Zoology	2.7	0.5	1.1	0.5	0.3	5.1	(2.9)
Other	1.2	0.3	1.1	1.0	0.2	3.8	(2.3)
Physical Science	1.4	0.3	1.7	0.7	0.1	4.2	(2.9)
Mathematics	3.5	0.9	1.0	0.8	0.4	6.6	(5.2)
Physics	1.2	0.2	3.2	0.4	0.1	5.1	(3.8)
Chemistry	0.7	0.2	1.5	0.6	0.1	3.1	(1.4)
Engineering	1.6	0.1	1.8	0.9	0.1	4.4	(3.0)
Social Sciences	1.9	0.6	1.5	1.0	0.4	5.5	(3.4)
Psychology	0.8	0.4	1.7	0.8	0.3	3.9	(2.4)
Sociology	2.9	1.2	1.5	1.0	0.5	7.2	(5.0)
Pol. Sci.	3.0	0.5	0.8	1.2	0.4	6.0	(4.6)
Economics	2.8	0.8	1.6	1.5	0.3	7.0	(5.8)
Humanities	3.8	1.9	0.7	1.4	0.6	8.4	(6.4)
History	3.6	1.6	0.8	1.4	0.7	8.2	(5.7)
F. Lang.	4.0	1.1	0.7	1.3	0.4	7.5	(6.4)
English	3.8	3.2	0.5	1.3	0.7	9.4	(7.7)
All Fields	1.9	0.7	1.4	0.9	0.3	5.2	(3.2)

*Numbers in parentheses are medians for total years of employment during the predoctoral period.

attendance failed to equal the BA-PHD figure—interestingly enough, these fields tend to be those of longer total duration!

AGE AT TIME OF DEGREE CONFERRAL

We may infer from the data which have been reviewed that humanities and social science graduates, on the average, attained the doctorate later in life than graduates in the natural science fields. Data on age of graduates at time of conferral of the doctorate and at selected earlier points are provided in Table 2.9.

At time of conferral of the doctorate, the typical graduate in chemistry (the youngest group) was about 28 years of age and the typical graduate in English (the oldest group) was about 35 years of age. Excluding the field of psychology, for which the median age was 30 years, social sciences and humanities medians ranged from 32.5 years to 34.9 years. These ages correspond roughly to the 75th percentiles in the distributions for science graduates. In essence, only about one-fourth of the graduates in science fields were older than the typical social science or humanities graduate when the Ph.D. was conferred.[5]

There was very little variability among fields in respect to age at time of conferral of the baccalaureate degree. The median for the entire sample was 22.4 years. Data not shown indicate even less among-field variation in respect to age at high school graduation for which the sample median was 17.6 years.

MAJOR TRENDS

It is quite evident that "time taken to attain the doctorate" is a complex variable. It is in terms of elapsed time to the doctorate—from the baccalaureate degree, from time of entry into graduate study, or from the master's degree—that we find the greatest variation among fields and among individuals within fields. If years "in attendance" constituted the basic measure of duration, not only would there be relatively little variation among the fields but the fields now characterized by earlier attainment

---

[5] Berelson (1960, p. [illegible]64) reports, from NRC data, median ages for various fields as follows: physical sciences, 29; biological sciences, 30; social sciences, 33; humanities, 35; arts and sciences, 31. See also Davis (1962, p. 29); Pressey (1944, 1949, 1962).

TABLE 2.9

Age at Time of Conferral of Bachelor's Degree, Graduate Matriculation, and Conferral of the Doctorate, By Field

Field	N*	Bachelor's degree	Graduate matriculation	Doctorate: ages corresponding to selected percentile ranks		
		Median	Median	P_{25}	P_{50}(Mdn)	P_{75}
Biosciences	334	23.0	24.4	28.4	31.0	33.9
Botany	101	23.4	25.1	29.2	31.3	33.6
Microbiology	83	22.9	24.1	27.8	30.6	33.1
Zoology	67	22.8	24.1	28.6	31.6	35.1
Other Biosciences	83	22.8	23.9	28.2	30.2	33.7
Physical Sciences	835	22.1	23.3	27.1	29.3	32.6
Mathematics	130	22.0	23.0	28.2	31.6	36.1
Physics	122	22.0	22.9	28.2	30.4	33.3
Chemistry	410	22.0	22.8	26.5	28.4	31.4
Engineering	173	22.4	23.8	27.2	29.4	32.7
Social Sciences	411	23.0	24.4	29.0	31.5	35.3
Psychology	192	23.2	24.3	28.2	30.0	32.9
Sociology	98	22.6	24.4	29.5	33.2	36.8
Political Science	65	22.2	24.6	30.2	32.5	35.9
Economics	56	23.2	24.2	31.2	34.0	38.5
Humanities	329	22.3	23.8	30.3	33.7	39.5
History	143	22.4	23.9	29.7	33.9	41.4
Foreign Languages	86	22.0	23.3	29.9	33.3	38.9
English	100	22.4	24.2	31.8	34.9	40.2
All Fields	1909	22.4	23.6	28.0	30.8	34.6

*Number of cases for which adequate data were available.

of the degree (in terms of age or time lapse) would also be adjudged the "longer" fields!

However, the significant reality is that the process of entering upon and successfully completing a program of studies, examinations and research culminating in award of the Ph.D. is a quite prolonged one for the *typical* individual in every field; less so in the sciences than in the social sciences and humanities but nonetheless relatively prolonged in even the "fastest" fields.

Of particular interest is the evidence that fields in which a substantial proportion of the graduates entered college, or other types of teaching situations during the predoctoral period are those for which elapsed time is greater. When the fifteen fields are ranked in terms of mean BA-PHD time lapse and incidence of predoctoral employment in college teaching, the high degree of correspondence between these two variables is indicated by a rank correlation coefficient of rho = .93, which is somewhat higher than the relationship (rho = .85) between time lapse averages and incidence of employment without regard to type.

Moreover, if we compare BA-PHD averages with the proportion of total years of predoctoral employment in each field accounted for by (a) the combined "teaching" categories and (b) the "other professional" category, we find rho = .85 and rho = —.86, respectively.

These trends are pointed up graphically in Figure 1 which shows the rather striking relationship between (a) proportion of years of predoctoral employment accounted for by teaching and (b) median time lapse to the doctorate for fifteen fields. Clearly, fields in which higher percentages of graduates evidenced a career orientation toward *teaching* (college or other, as reflected by predoctoral employment) are those characterized by higher time lapse medians. The distinctive separation of social sciences and humanities fields from natural science fields in respect to each of these variables is also revealed. Psychology and mathematics constitute exceptions.

The fact that many of these graduates contributed substantially to the professional manpower supply (as college teachers, etc.) during their predoctoral careers must not be discounted. However, in view of the relatively large amounts of predoctoral time involved in employment in many fields, it becomes extremely important to consider the extent to which such experience contributed, directly or indirectly, to the attainment of the objectives of doctoral programs in various fields. To paraphrase Bowen

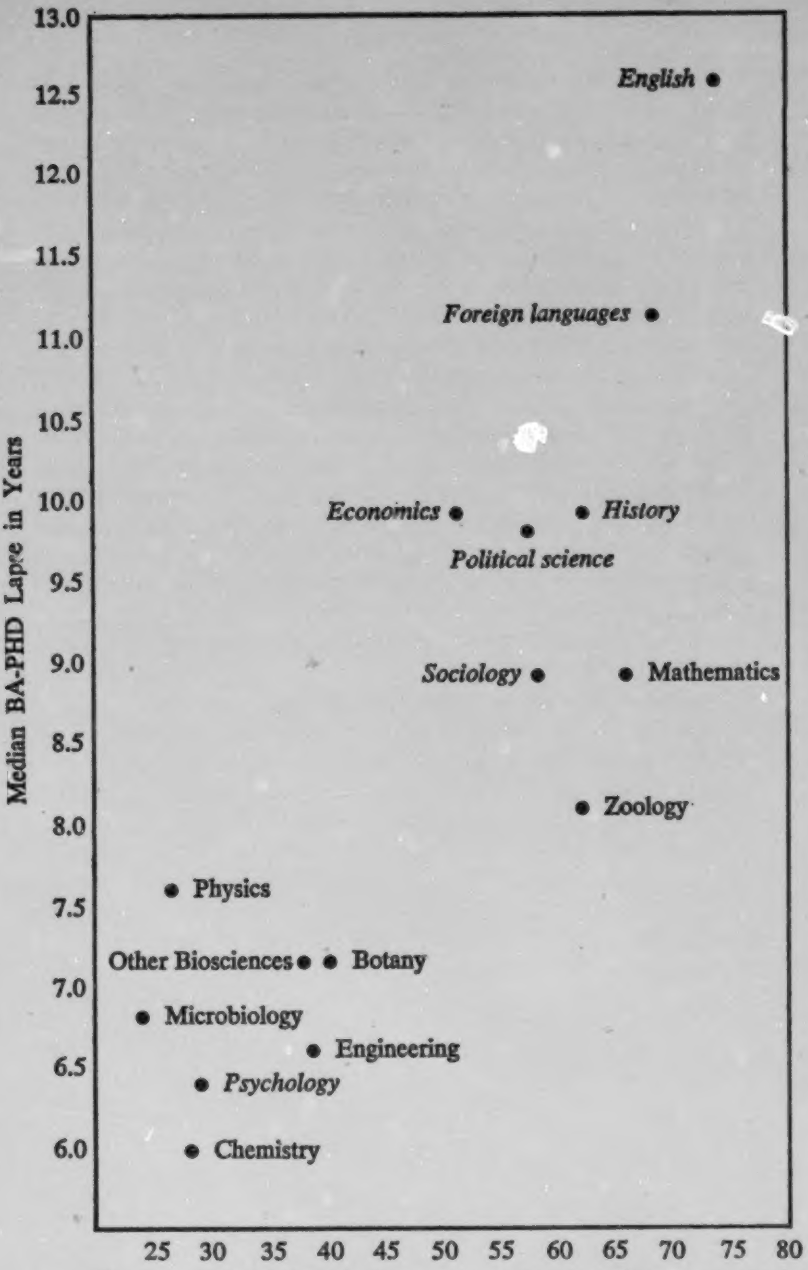

Figure 1. Per cent of Total Years of Predoctoral Employment in Teaching in Relation to Median BA-PHD Time Lapse for Fifteen Doctoral Fields

(1953, p. 179), one's view of this question will depend in part on his conception of the Ph.D.—as a degree reserved for mature persons, seasoned by years of practical experience or as a degree given to a person who has mastered the basic knowledge and techniques of his field and who shows ability and promise.

Whatever one may feel about this question, however, it is evident that attainment of the doctorate represents the culmination of a somewhat different and clearly more prolonged process in fields such as English, history, political science, foreign languages, or sociology than in fields such as chemistry, engineering, microbiology, botany, or psychology.

Moreover, it is clear that in all fields the average amount of time spent *in progress* to the doctorate is much greater than the frequently specified "three years of graduate study" and in most fields substantially more than four or five years following graduate matriculation; it should be recalled that only 14 per cent of these graduates attained the doctorate within four years *after beginning graduate study* (5 per cent in the humanities, 20 per cent in the physical sciences).

What are the views of the respondents regarding time taken to attain the doctorate? What are the important sources of delay? Why should there be such pronounced variability over fields and among individuals within each field? Evidence regarding these and other questions will be examined in the following sections of this report.

CHAPTER III

Factors Affecting Duration Of Doctoral Study: Respondents' Evaluation

More than 30 years ago, Dean John C. Metcalf (1931, pp. 62-63) observed that "[the candidate for the doctorate] has embarked on an adventure which may lead him into more devious ways than were followed by a medieval knight. Ordinarily, he will not be constantly in residence. But he will often return from his quest, touch base, as it were, be reassured or discouraged, and fare forth again for more contacts, revisions, or confirmations. The one thing he may be sure of is that more time will be required than he estimated at the start."

While this romantic characterization of the pursuit of a Ph.D. is less apt for some fields than for others, it probably holds true for a substantial number of individuals in all fields. The graduates provided a measure of support for Metcalf's observation: less than half (45 per cent) indicated that time taken to attain the doctorate was "approximately as expected" at the time the doctoral phase of their graduate work was initiated (Table 3.1). In nine of the 15 fields, initial expectation proved to be realistic for an even smaller percentage of graduates. Expectation was somewhat more realistic in the science fields than in the others; in five of the eight natural science fields, one-half or more of the graduates reported time taken was approximately as expected at the outset. The percentage of graduates without definite expectations in regard to time for completion of the degree program was relatively low (about 8 per cent).

With due consideration of the subjective and retrospective nature of the responses, the extent of discrepancies revealed

TABLE 3.1

Respondents' Evaluation of Amount of Time Actually Taken to Earn Doctorate in Relation to Expectation at the Outset: Percentage Distributions, By Field

Field	N	Amount of time taken, as compared to expectation				Had no definite expectation	No response
		Much greater	Somewhat greater	As expected	Less		
Biosciences	336	9.8	22.6	56.5	2.7	7.7	0.6
Botany	101	9.9	15.8	67.3	3.0	4.0	
Microbiology	85	8.2	25.9	54.1	3.5	8.2	
Zoology	67	11.9	29.8	40.3	1.5	13.4	3.0
Other	83	9.6	21.7	59.0	2.4	7.2	
Phy. Sci.	844	9.7	30.3	46.1	5.1	8.5	0.2
Mathematics	131	15.3	21.4	40.5	5.3	17.6	
Physics	124	14.5	41.1	31.5	2.4	10.5	
Chemistry	414	7.2	30.9	49.8	6.0	5.6	0.5
Engineering	175	8.0	28.0	52.0	4.6	7.4	
Soc. Sci.	418	16.5	32.5	39.2	5.0	6.5	0.2
Psychology	194	12.9	34.0	43.8	6.7	2.6	
Sociology	101	20.8	28.7	35.6	4.0	9.9	1.0
Pol. Sci.	66	12.1	36.4	37.9	4.5	9.1	
Economics	57	26.3	29.8	31.6	1.8	10.5	
Humanities	331	18.4	28.7	40.2	3.3	9.4	
History	143	20.3	28.0	40.6	2.1	9.1	
F. Lang.	86	17.4	27.9	50.0		4.6	
English	102	16.7	30.4	31.4	7.8	13.7	
All Fields	1929	12.7	29.2	45.4	4.4	8.1	0.3

between individual expectation and subsequent "reality" suggests that many individuals initiated the doctoral phase of their graduate programs with an unrealistic conception of the time likely to be taken for completion of all degree requirements. These data suggest, also, that the problem of reconciling rate of progress with initial expectation may have been a source of considerable anxiety, doubt, and undue self-examination on the part of many candidates.[1]

It is clear that for many individuals progress toward the doctorate may be characterized by considerable uncertainty. What are some of the major factors which affect the amount of time taken to complete doctoral programs? Are these factors operative to about the same degree in all fields? What factors account for differences in duration among fields? Evidence bearing on these questions was sought from institutional-departmental representatives (graduate deans and faculty) who were asked to comment on factors affecting duration and from graduates who were asked to indicate whether or not designated factors operated to increase duration of their own programs of study.

VIEWS FROM THE GRADUATE SCHOOL

Graduate deans and graduate faculty, with some differences in emphasis, tended to stress the following in their comments on factors affecting duration:

(1) continuity of study and amount of time devoted to study
(2) the dissertation and research
(3) student attributes
(4) the foreign language requirement
(5) adequacy of undergraduate preparation
(6) particular requirements or patterns of requirements
(7) departmental expectations and faculty attitudes.

---

[1] In his study of graduate education, Berelson (1960, p. 295) asked recent recipients of the doctorate and graduate faculty, "As it operates, [does] the doctoral program produce too much anxiety in many students, and unnecessarily so?" In arts and sciences fields, *recent recipients* of the doctorate tended to respond, "yes," while graduate faculty tended to say "no." Uncertainty regarding "date of completion" of the degree program is one potential source of anxiety.

First in total frequency of mention were factors which might affect *continuity of study and the amount of time devoted to study*, such as the economic status of the student, his family obligations and number of dependents. Emphasis centered on the "type and nature of financial assistance available to students," e.g., fellowships versus part-time teaching. The relative attractiveness of job opportunities for those with less preparation than the doctorate was also pointed up as a factor influencing "continuity" of study.

Factors related to the dissertation and research, featured somewhat more prominently by natural scientists, were emphasized by many. More specifically, the following variables were suggested as most important:

(a) nature and scope of the thesis topic—its clarity of focus
(b) time of initiation of thesis research
(c) availability of equipment, library resources, etc.
(d) prior experience of students in research
(e) ability of students to organize and write up results of research.

The unpredictable course of much research was also mentioned by several respondents.

Student attributes, recognized as important, at least implicitly, by all respondents, were emphasized more often by faculty representatives than by deans and ranked third in total frequency. Although there were frequent references to ability and aptitude, other types of variables (e.g., attitude, persistence, drive, industriousness, general maturity, desire, application, and the like) were even more frequently cited.

Factors related to the foreign language requirement and to undergraduate preparation generally were mentioned with about equal frequency as variables affecting time. With regard to languages, institutional-departmental representatives stressed (a) amount and quality of prior preparation, (b) availability of facilities for preparing graduate students to meet the requirement and (c) the extent to which the requirement was perceived as functional or meaningful by faculty and students. With regard to undergraduate study, emphasis was placed on the quality, nature, and level of preparation in major and cognate or collateral fields. Lack of "uniformity" in undergraduate programs was stressed by a few, particularly by representatives of social science departments.

Particular requirements or patterns of requirements were cited as potentially important variables relatively infrequently by deans but somewhat more frequently by graduate faculty, as follows:

(a) the minor field—expectations about, amount of course work required, methods of satisfying the requirement, etc.
(b) minimum number of credit hours for the degree
(c) master's degree requirement for potential Ph.D. candidates
(d) required minimum time lapse between meeting one requirement and meeting the next
(e) rigidly sequential nature of the patterns of requirements
(f) required reductions in course loads of students on assistantships.

Second-ranked by graduate deans, although seldom mentioned by graduate faculty, were factors related to *departmental expectations* and *faculty attributes and responsibilities.* A major variable was held to be the nature and degree of clarity of departmental expectations and programs—the general climate within a department, methods of acquainting students with departmental "expectations." The major professor, thesis director, and/or dissertation committee were cited as potentially critical variables in terms of the extent and nature of guidance given to students, degree of responsibility, standards set, attitudes toward the advisory process and students, and in the extent to which they insisted upon "steady progress."

GRADUATES' ASSESSMENTS OF DESIGNATED FACTORS

In many respects, the variables stressed by institutional-departmental representatives were reflected in the responses of their former students who were asked to assess the impact of a number of specific factors on their own rates of progress toward the doctorate. Ratings were obtained for 15 factors, as follows:

(1) Lack of coordination between beginning and advanced stages of graduate work
(2) Discontinuity of graduate attendance
(3) Inadequate undergraduate preparation in graduate field of specialization
(4) Transferring from one graduate institution to another
(5) Change(s) in field of specialization during graduate study
(6) Inadequate preparation in foreign languages prior to beginning graduate work
(7) Change(s) in dissertation topic after some work already completed
(8) Changes in membership of dissertation committee
(9) Writing dissertation off-campus while engaged in full-time employment
(10) Nature of the dissertation subject, per se
(11) Work as a research assistant
(12) Work as a teaching assistant
(13) Family obligations
(14) Financial problems
(15) Health problems.

Graduates were asked to evaluate each factor in terms of the extent to which it affected the amount of time taken to "get a doctorate" according to the following alternatives: "lengthened time considerably," "lengthened time somewhat," "did not lengthen time" and "the conditions or circumstances implied by this item were not present in my case."

Relative Importance of Factors

Shown in Table 3.2 are percentage distributions of responses for the fifteen factors in the entire sample. Factors are listed in descending order with respect to percentage of responses attributing some lengthening influence.

The five factors most frequently cited by graduates were *discontinuity of graduate attendance, work as a teaching assistant, nature of the dissertation subject, writing the dissertation off-campus while engaged in full-time employment,* and *financial*

TABLE 3.2

Distributions of Ratings of Fifteen Designated Factors as Influences On Length of Doctoral Programs: Total Sample (N = 1929)

Designated factors*	Lengthened time considerably	Lengthened time somewhat	Did not lengthen time	Circumstances implied were not present	No response
	Percentage distribution of responses				
Discontinuity of graduate attendance	17.1	14.9	7.4	56.0	4.6
Work as teaching assistant	6.9	25.0	20.6	41.2	6.3
Nature of dissertation subject	9.8	20.6	34.5	29.7	5.3
Writing dissertation off-campus	13.9	13.3	11.1	57.5	4.2
Financial problems	11.0	16.3	30.2	35.9	6.6
Inadequate preparation in languages	4.0	23.2	40.0	28.0	4.7
Lack of coordination: beginning and advanced phases of graduate study	5.6	18.6	20.0	50.0	5.9
Family obligations	7.4	15.6	31.1	39.6	6.4
Inadequate preparation in field	3.3	19.5	22.8	49.1	5.2
Transferring	5.8	16.5	18.1	55.0	4.6
Changes in dissertation topic	4.1	10.3	9.0	71.3	5.2
Changes in field	2.9	8.9	10.0	72.7	5.5
Work as a research assistant	1.8	9.0	26.7	53.6	9.0
Changes in dissertation committee	1.6	4.6	17.8	70.5	5.4
Health problems	0.9	3.3	19.0	68.2	8.6
Mean (all factors)	6.4	14.6	21.2	51.9	5.8

*Factors are listed in descending order with respect to the percentage attributing some lengthening influence.

problems. Each of these factors was cited by more than one-fourth of the respondents.

Of moderate importance, cited by between 15 and 25 per cent of the respondents, were *inadequate undergraduate preparation in foreign languages, lack of coordination between beginning and advanced phases of graduate study, family obligations, inadequate undergraduate preparation in the field of graduate major,* and *transferring from one graduate institution to another.*

Judged least important among the fifteen factors, although constituting considerable lengthening influences for some individuals, were *changes in the dissertation topic, changes in field of specialization during graduate work, work as a research assistant, changes in the dissertation committee,* and *health problems.*

The data in Table 3.2 are of interest for several reasons. First, they provide evidence regarding the relative frequency of occurrence of the factors. By inference from the proportion of responses indicating that the circumstances implied by a given factor *were not present,* we find, for example, that only 28 per cent of the graduates felt that they were "adequately prepared" in foreign languages and that only 49 per cent were "adequately prepared" as undergraduates in the major field.

Secondly, the data point up a clear distinction between work as a teaching assistant and work as a research assistant in respect to judged influence on time taken to attain the degree. Research appointments were infrequently evaluated as contributing to "length" whereas teaching assistantships were frequently judged to have had a lengthening influence—"work as a teaching assistant" was second-ranked among the fifteen factors, being cited by about 32 per cent of the respondents, while "work as a research assistant" ranked 13th, being cited by only 11 per cent of the group.

Thirdly, it should be noted that ten of the fifteen factors were judged to have had some lengthening influence by at least one-fifth of all graduates. It is evident that a variety of factors may operate to produce the observed differences among individuals and among fields with respect to time taken to attain the doctorate. Although certain factors may be related (e.g., writing the dissertation off-campus during a period of full-time employment, financial problems, family obligations) it cannot be assumed that attention given to one factor (e.g., finances) is sufficient for alleviation of the conditions implied by others (e.g., discontinuity of attendance). Lack of adequate financial support, for example, is only one of several reasons why graduate students might postpone or interrupt their studies.

Finally, these factors are not operative to the same degree in all fields, as will be seen in the following sections.

Comparison of factors by field

Shown in Table 3.3 are data indicating the relative importance of the fifteen factors in each of the fifteen fields. The values tabled are percentages (rounded to nearest whole) attributing *some* ("moderate" or "considerable") lengthening influence to the respective factors. Within each field, the five or six leading factors are indicated by special type.

Among the trends which merit some special comment are the following:

(1) *Discontinuity of attendance* ranks among the leading factors in essentially all fields but it is a more pronounced factor in those fields characterized by longer elapsed time to the doctorate.

(2) *Work as a teaching assistant,* second ranked in the entire sample, was relatively low-ranked as a lengthening influence by social science graduates generally, although it was among the leading factors for political science graduates. It was, in fact, more consistently cited for its lengthening influence in the natural sciences than in the social sciences or humanities and 47 per cent of chemistry graduates indicated that their work as a teaching assistant had some lengthening influence—between 10 and 19 per cent said the lengthening effect was considerable. Except in the social sciences, then, graduates frequently cited the teaching assistantship as a lengthening influence.

(3) The *nature of the dissertation topic* was a factor influencing length of program for about 30 per cent of all graduates, and was among the leading factors in most fields. It was least significant for mathematics graduates.

(4) *Writing the dissertation off-campus during a period of full-time employment* was strikingly more significant in the social sciences and humanities than in the natural sciences. Over 45 per cent of graduates in sociology, economics, history and English cited this factor as a lengthening influence while fewer than 25 per cent of the graduates in botany, microbiology, other biosciences, chemistry and engineering did so.

(5) *Financial problems,* fifth-ranked in the total sample,

TABLE 3.3

Percentage of Graduates Attributing Some Lengthening Influence to Designated Factors: Natural Science Fields

Factor	Bio-sciences	Botany	Micro-biology	Zoology	Other Bio. Sci.	Physical sciences	Mathe-matics	Physics	Chemis-try	Engi-neering
Discontinuity of attendance	**(25)***	**21***	**24***	**28***	**28***	**(27)***	**40***	**33***	**23***	**21**
Work as teaching assistant	**(36)**	**33**	**32**	**42***	**39**	**(36)**	**32***	26	**47**	**21**
Nature of dissertation	**(34)***	**30**	**27***	**43***	**40***	**(28)**	20	31	**28**	**33***
Off-campus dissertation	(19)*	16	19	25*	19*	(18)	25*	29*	11	**21**
Financial problems	**(25)***	20*	20	**34***	**28***	**(23)**	**27***	**35***	19	20
Inadequate foreign language preparation	**(23)**	**29**	11	**30**	26	(22)	14	21	20	**32**
Lack of coordination: beginning and advanced graduate study	(19)	16	**26**	19	17	**(24)**	**30**	24	**24**	18
Family obligations	(19)	18	12	**28***	20	(21)	27*	**33***	16	19
Inadequate undergraduate preparation in field	**(23)**	**26**	24	22	19	(23)	**30**	**35**	**23**	11
Transferring (graduate institutions)	(22)	21	**25**	22	22	(22)	25	**32**	**23**	14
Changes in dissertation topic	(12)	11	12	12	12	(16)	18	19	17	9
Changes in graduate field	(13)	11	8	18	11	(9)	21	9	7	14
Work as research assistant	(13)	12	9	19	13	(11)	8	10	11	16
Changes in dissertation committee	(5)	7	4	4	4	(4)	9	2	2	6
Health problems	(3)	3	2	4	1	(4)	4	6	5	2

*** "Considerable lengthening effect" for 10-19 per cent.**

TABLE 3.3, con't.

Percentage of Graduates Attributing Some Lengthening Influence to Designated Factors: Social Sciences and Humanities

	Social sciences	Psychology	Sociology	Political Sci.	Economics	Humanities	History	Foreign languages	English
Discontinuity of attendance	(37)**	27*	27*	48**	48**	(46)**	48**	39**	50**
Work as teaching assistant	(18)	11	18	38	18	(34)*	22	45*	42*
Nature of dissertation	(31)*	27	32	27*	46*	(32)*	36*	30*	29*
Off-campus dissertation	(37)**	29*	48**	33**	51***	(45)**	47**	38**	49***
Financial problems	(32)*	25	38*	33**	42*	(35)*	38*	29*	36*
Inadequate foreign language preparation	(38)	32	30	44	61*	(32)	46	7	34
Lack of coordination: beginning and advanced graduate study	(33)	30	35*	34*	37	(20)	23	10	22
Family obligations	(25)	20	29*	36*	23	(29)*	28	23	36*
Inadequate undergraduate preparation in field	(26)	24	27	26	32	(18)	18	18	19
Transferring (graduate institution)	(22)	26	19	24	16	(20)	19	17	24
Changes in dissertation topic	(15)	15	17	12	18	(12)	10	12	15
Changes in graduate field	(16)	11	21	20	19	(11)	9	15	11
Work as research assistant	(12)	8	23	11	10	(5)	8	3	2
Changes in dissertation committee	(13)	16	11	4	10	(7)	7	3	9
Health problems	(6)	2	2	6	9	(7)	10	5	4

*"Considerable lengthening effect" for 10-19%; **"Considerable lengthening effect" for 20-29%; ***"Considerable lengthening effect" for 30-39%.

were relatively important for most fields but were most frequently cited as a lengthening influence in social science and humanities fields.

(6) *Inadequate undergraduate preparation in foreign languages* was particularly significant for social sciences and humanities. It was cited, for example, by 61 per cent of economics majors and 46 per cent of history majors. Less than one-fourth of natural science graduates checked this factor.

(7) *Lack of coordination between the beginning and advanced phases of graduate study* was also quite significant for social science graduates—30 per cent or more in each of the fields cited this factor. Moreover, *changes in graduate fields of specialization* and *changes in the dissertation topic,* both logically related to "lack of coordination," were also cited more frequently by social science graduates and humanities graduates than by natural science respondents.

(8) *Inadequate undergraduate preparation in field of graduate major* was most significant for social sciences. It was also of moderate importance in natural science fields. Fewer than one-fifth of the humanities graduates, however, attributed a lengthening influence to this factor.

(9) *Family obligations* more frequently influenced time taken to attain the doctorate in the social sciences and humanities than in the natural sciences. This is logically related both to the higher average ages of individuals in these fields and to the higher proportion of women in these fields.

(10) *Transferring from one graduate institution to another* lengthened time for about one-fifth of the graduates in each major area.

(11) *Work as a research assistant* was of minor importance as a lengthening influence in all fields.

Why More Rapid Completion of Requirements in the Natural Sciences?

Further insight into the nature of factors affecting time taken to complete doctoral requirements is provided through examination of responses of graduate deans and faculty representatives who were asked to "account for" the fact that natural science graduates tended to complete doctoral requirements more rapidly than graduates in other fields.

More rapid completion of requirements in natural science fields was rationalized in terms of the following types of factors:

(1) Research organization and approach to the dissertation

(2) Nature and amount of financial support

(3) The degree of structure inherent in the disciplines and the programs

(4) Attributes of students

(5) Other factors.

Most frequently mentioned were *factors related to research and the dissertation* in which the natural sciences were deemed to have an advantage:

(a) Dissertation problems in science fields are easier to define, more clearly focused. Once a problem is defined, appropriate research procedures and techniques are usually specified. And, criteria for evaluating the "success" of a research project tend to be more objective in the natural sciences.

(b) Dissertation research is begun earlier in the sciences.

(c) Research is a more natural aspect of science programs and there is a closer tie-in between course work and research.

(d) Sciences (natural science programs) tend to emphasize demonstrated research competence and specialization rather than "mastery of a field (fields) of knowledge."

(e) Work done by science graduate students (project research, assistantship research) more often has a direct contribution to make to the dissertation.

(f) By virtue of the nature of working relationships in many science fields, there is closer contact between students and faculty generally and between students and dissertation directors.

(g) Because research in sciences often requires special equipment, the off-campus dissertation is less frequently a feasible proposition.

(h) Dissertations tend to be shorter in the sciences. Writing, composition, assembly, and presentation of the dissertation is a less pronounced burden; literary style is less often a major factor in science presentations.

It was suggested, also, that sciences have *the advantage of a greater amount of financial support and of types of financial support* which afford greater opportunity for sustained attention to completion of requirements (e.g., research assistantships, fellowships).

About one-sixth of all responses relate to what might be termed *the greater degree of "structure" characteristic of science disciplines and programs,* conducive to a greater degree of articulation between undergraduate and graduate work and between various aspects of degree programs—research, course work, etc.:

(a) Knowledge in the sciences is more "absolute," "precise," "definite"—more definitely sequential.

(b) There is a greater degree of articulation between undergraduate and graduate programs in the natural sciences than in the social sciences and humanities.

(c) Program requirements in the sciences tend to be more clearly defined, more explicit.

Of the factors cited as conducive to more rapid completion of requirements, slightly less than one-fifth related to *student characteristics* or *characteristic patterns of career development* in the sciences. It was suggested that, as compared to students in the social sciences and humanities, science graduate students tend to be younger and more research oriented. Science students are likely to have developed definite career and degree goals at an earlier age. One respondent suggested the hypothesis that ability-interest-personality variables conducive to choice of science fields may have as a concomitant a "penchant" for orderliness and time efficiency.

Other factors mentioned were as follows:

(a) Early completion of the degree is a traditional pattern in sciences.

(b) Better prospects for employment in industry for science graduates tend to give added incentive for rapid completion of requirements.

(c) Interim, on-the-job experience is less often judged to be important in science fields.

(d) The direct Ph.D., bypassing the master's degree, may be a factor in reducing time.

RECAPITULATION

Progress toward the doctorate is fraught with considerable uncertainty. Less than half the graduates, for example, indicated that time taken by them in completing degree requirements was approximately as expected when they began the doctoral phase of their programs; in some fields more than one-fifth of the graduates reported that the amount of time actually taken was *much greater* than had been anticipated. Rate of progress toward the degree, of course, may be influenced by a variety of factors any of which might lead, in an individual case, to substantial prolongation of the "quest."

Discontinuity of attendance, work as a teaching assistant, the nature of the dissertation problem, writing the dissertation off-campus, financial problems, inadequate preparation in foreign languages, lack of coordination between beginning and advanced stages of graduate work, family obligations, inadequate undergraduate preparation in the major field, transferring from one graduate institution to another—each of these factors was cited by at least 20 per cent of the graduates as having had some "lengthening influence." Several other factors, cited less frequently in the total sample, were very potent for some individuals.

Graduate deans and departmental representatives suggested a pattern of variables affecting "duration" quite similar to that reflected in the experience of their former students—degree of continuity of study and amount of time devoted to study, approach to the dissertation and research, the foreign language requirement, and nature of undergraduate preparation. They also pointed up the importance of individual differences in academic ability and in motivation, drive, persistence, industriousness, etc. Deans, particularly, noted that the *degree of clarity of institutional and departmental expectations* regarding doctoral requirements was an extremely important factor, along with faculty attitudes toward students and the nature of their advisory relationships with students.

Certain institutional and/or departmental policies were cited as important variables, e.g., requiring the master's degree of potential Ph.D. candidates, establishing a minimum number of credit hours for the Ph.D. degree, enforcing a rigidly sequential pattern of completing requirements, etc.

While all factors cited appear to be present to some extent in every field, there are obvious differences in the degree to which they are operative in the respective fields. The relative potency of the ten leading factors, according to graduates' assessments, is pointed up in summary form in Table 3.4. It is clear, for example, that proportionately fewer graduates in natural science fields emphasized discontinuity of graduate attendance, writing the dissertation off-campus during a period of full-time employment, financial problems, inadequate foreign language preparation, lack of coordination between beginning and advanced stages of graduate work, and family obligations.

Numbered among the natural science fields, are the majority of fields of shorter duration in average elapsed time to the doctorate. But, in more direct form, the relation between median time lapse (entry-PHD) and incidence of selected factors as "lengthening influences" may be summarized for the fifteen fields under consideration by means of rank order correlation coefficients as follows:

Factor	Correlation (rho): Median time lapse vs. incidence of factor
Discontinuity of attendance	.83
Off-campus dissertation	.81
Financial problems	.72
Family obligations	.62
Health problems	.49

This set of interrelated factors (e.g., fields with high incidence of "discontinuity of attendance" also tend to be high in incidence of "off-campus dissertations") reflects differences among the fields in the degree of "temporal continuity" which is characteristic of student progress toward the doctorate.

Differences in duration among the fields may also be a function of differences in the degree of "structural" or "programmatic continuity" reflected in the process of attaining a doctorate—i.e., the characteristic degree of articulation of all phases of the total

TABLE 3.4

Relative Potency of Various Factors as "Lengthening Influences" in Four Major Academic Areas*

Factor**	Biosciences	Physical Sciences	Social Sciences	Humanities
Discontinuity of attendance	Moderate	Moderate	Very high	Very high
Work as a teaching assistant	High	High	Low	High
Nature of dissertation topic	High	Moderate	High	High
Off-campus dissertation	Low	Low	Very high	Very high
Financial problems	Moderate	Moderate	High	High
Inadequate foreign language preparation	Moderate	Moderate	High	High
Lack of coordination between beginning and advanced study	Low	Moderate	High	Moderate
Family obligations	Low	Moderate	Moderate	Moderate
Inadequate undergraduate preparation in field of study	Moderate	Moderate	Moderate	Low
Transferring	Moderate	Moderate	Moderate	Moderate

**Very high potency*—some lengthening influence for 35 per cent or more and considerable lengthening influence for more than 20 per cent.

High potency—some lengthening influence for 30-40 per cent.

Moderate potency—some lengthening influence for 20-29 per cent.

Low potency—Some lengthening influence for less than 20 per cent.

**Five additional factors were generally of low potency.

programs of studies (undergraduate and graduate), examinations, and research which culminate in award of the degree. Among graduates, for example, "lack of coordination between beginning and advanced stages of graduate work" was much more frequently cited by those in social science fields than by those in natural science fields, as were "changes in graduate field of study."

Institutional-departmental representatives, in accounting for more rapid completion times in the natural sciences than in other fields, mentioned the degree of "structure" which is characteristic of the natural science disciplines, their more "definite" program requirements, the closer relationship between course work and dissertation research, and other factors conducive to what we have termed "programmatic continuity." They suggested also that a *tradition* of "early completion" and earlier establishment of appropriate career and study goals among students were conducive to more rapid completion of requirements in the natural sciences.

Of considerable interest is the fact that *less than one-fourth of the reasons given to account for more rapid completion of all requirements in the sciences related to financial assistance and support;* almost one-half of all factors cited related to research organization and approach to the dissertation and/or the more structured nature of the natural science disciplines (more definite expectations and greater articulation of programs of examinations, studies, and research).

Stress on factors related to "research" is natural in any consideration of programs of doctorate study. It is significant in this context that "work as a research assistant" was relatively *infrequently* cited as a "lengthening influence" either by graduates or by institutional-departmental representatives, but that "work as a teaching assistant" was among the five leading "lengthening influences" according to graduates' assessments.

In essence, the assessments of graduate deans and faculty representatives, and those of their former students, point up the variety of factors which may influence patterns of progress toward the doctorate and which should be considered in any effort to account for differences among individuals in time taken to attain the degree and for differences among fields in average duration. Special consideration, however, should be given to certain variables reported by many individuals as "lengthening influences" which require more detailed analysis:

(1) discontinuities in progress toward the doctorate and the individual and situational variables which are involved

(2) patterns of financial assistance and support during the period of graduate study

(3) the research requirement

(4) the foreign language requirement.

We now turn to an examination of each of these topics in the light of evidence from the "record" as reported by the graduates.

CHAPTER IV

Delays and Discontinuities In Progress to the Doctorate

It is theoretically possible in most fields for an individual to initiate graduate study immediately after receiving a bachelor's degree and within some three years successfully to complete a program of studies, examinations, and research culminating in the award of a Ph.D. As we have seen, however, the degree of continuity—temporal and programmatic—implied by this theory is not characteristic of patterns of progress to the doctorate and the theoretically possible time-span is much less than the actual time-span in the majority of cases.

Deviations from this theoretical model may be accounted for by a number of factors, both individual and situational, which influence the timing of entry of individuals into graduate school and the degree of continuity of their progress after entry. Delayed entry into graduate school, for example, may be due to the fact that relevant graduate study goals were not developed at time of college graduation; to general uncertainty regarding career goals; to desire for "practical" experience; to military obligations; to financial problems and family responsibilities; or to some combination of these and other variables. Interruptions in graduate attendance may be due to many of these same variables, plus other factors more directly related to the nature of the graduate study program itself.

All recent graduates were asked to provide information regarding (a) the timing of development of relevant graduate study goals, (b) immediate versus delayed entry into graduate school, (c) interruptions in attendance prior to completion of course and residence requirements for the doctorate and, as a special case, (d) interruptions following conferral of a master's degree. They were also asked to indicate which of several designated factors were associated with delayed entry into graduate school or with interruptions in graduate attendance and were given an opportunity to write in factors not included on the questionnaire. In addition, information provided by respondents regarding graduate schools attended and subdoctoral degrees earned permits a general description of institutional attendance and degree patterns, a factor which is relevant to the question of "continuity" of progress to the doctorate.

TIMING OF DEVELOPMENT OF GRADUATE STUDY GOALS AND DISCIPLINARY INTERESTS

Recent graduates were asked to indicate the period (during high school, during college freshman year, etc.) during which (a) pursuit of graduate study became a *definite personal goal,* (b) working toward a doctorate degree became a *definite personal goal,* and (c) they first became interested in the field which subsequently became the doctoral major.

The data in Table 4.1, which indicate the extent to which these graduate study goals and disciplinary interests had become established *by the end of the college senior year,* are quite revealing.

(1) When they received the bachelor's degree, only about three of ten graduates in the total sample had the definite personal goal of "working toward a doctorate." In the fields of English, economics, political science, engineering, zoology, and microbiology fewer than one-fourth of the graduates were definitely "doctorate oriented," but in physics, psychology, chemistry and other biosciences, more than one-third were so oriented.

(2) For more than one-fourth (27.6 per cent) of all graduates "pursuit of graduate study" had *not* become established as a definite personal goal; more than four out of ten English graduates (42.1 per cent) did *not* have this graduate study goal at time of college graduation. In general this goal was least prevalent among the humanities graduates of whom only 65 per cent were personally committed to "the pursuit of graduate study," when they received their bachelor's degrees.

(3) Interest in a graduate field was most generally established in four fields—physics, chemistry, engineering, and psychology—in which, by the end of their senior year, more than

TABLE 4.1

Extent to Which Certain Graduate Study Goals and Disciplinary Interests Had Developed before College Graduation, By Field

		By end of college senior year (per cent indicating)		
			Definite personal goal to	
Field	N	Interest in field of doctorate established*	Pursue graduate study	Earn a doctorate
Biosciences	336	69.0	72.3	25.0
Botany	101	66.3	76.2	25.7
Microbiology	85	71.8	72.9	23.5
Zoology	67	71.6	71.6	14.9
Other Biosciences	83	67.5	67.5	33.7
Physical Sciences	844	82.9	74.2	30.7
Mathematics	131	71.0	66.4	26.0
Physics	124	87.9	72.6	37.1
Chemistry	414	85.3	78.4	36.7
Engineering	175	82.8	65.8	15.4
Social Sciences	418	71.0	74.6	30.1
Psychology	194	77.8	79.8	37.1
Sociology	101	64.4	73.2	30.7
Political Science	66	68.2	73.0	21.2
Economics	57	63.2	61.5	15.8
Humanities	331	72.8	65.0	24.8
History	143	74.8	66.5	26.6
Languages	86	68.6	71.0	29.1
English	102	73.5	57.9	18.6
All Fields	1929	76.2	72.4	29.9

*Interest established in field which subsequently became doctoral major.

three-fourths of graduates had become interested in the doctoral field. In general, the percentages reported for social sciences, other than psychology, and for humanities fields are somewhat lower than the overall percentage of 76.2, but this is also true for biological science fields. In essence the physical science fields, other than mathematics, clearly are characterized by earlier establishment of disciplinary interests.

(4) These data indicate that "working toward a doctorate" became established as a definite goal for the majority of individuals in all fields *after college graduation*. Thus, "pursuit of the doctorate" represents an emergent goal, we may infer, crystallizing for many individuals only *after* entry into graduate school[1] Indeed, data not shown indicate the modal category to be "during the first year of graduate study." The decision to undertake graduate study, however, appears to have become established for most individuals during the undergraduate years, although we have seen that this goal was absent in more than one-fourth of the cases at time of college graduation.

INCIDENCE OF DELAYED ENTRY AND INTERRUPTIONS IN GRADUATE STUDY

About one-third (34.0 per cent) of the sample reported a delay of at least six months between graduation from college and entry into graduate school. Roughly 37 per cent reported that, prior to completion of course and residence requirements for the doctorate, there were one or more periods of non-attendance, in excess of six months (see Table 4.2). Thus, about two-thirds of all graduates proceeded directly into graduate study and about 63 per cent were essentially continuously in attendance as graduate students from time of entry into graduate school until they completed all course and residence requirements for the doctorate degree. Differences among fields are apparent, however:

(1) Of the seven fields with longest time-lapse to the doctorate (humanities fields, social sciences other than psychology and mathematics) all are characterized by the fact that (a) incidence of interruption following entry into graduate study was *greater* than incidence of delayed entry into graduate school and

---

[1] These trends are consistent with evidence from national samples. See, for example, Gropper and Fitzpatrick (1959, pp. 24-25), Berelson (1960, pp. 143-144) and Davis (1962, pp. 27-30).

TABLE 4.2

Incidence of Delayed Entry into Graduate School and Interruptions in Graduate Study Prior to Completion of Course and Residence Requirements, Respectively, By Field

Field		Delayed entry*		One or more interruptions**	
	N	No.	Per cent	No.	Per cent
Biosciences	336	111	33.0	104	31.0
Botany	101	38	37.6	30	29.7
Microbiology	85	24	28.2	28	32.9
Zoology	67	18	26.9	24	35.8
Other Biosciences	83	31	37.4	22	26.5
Physical Sciences	844	276	32.7	247	29.3
Mathematics	131	44	33.6	58	44.3
Physics	124	34	27.4	44	35.5
Chemistry	414	123	29.7	103	24.9
Engineering	175	75	42.9	42	24.0
Social Sciences	418	134	32.1	168	40.2
Psychology	194	52	26.8	56	28.9
Sociology	101	36	35.6	46	45.5
Political Science	66	26	39.4	37	56.1
Economics	57	20	35.1	29	50.9
Humanities	331	134	40.5	193	58.3
History	143	55	38.5	79	55.2
F. Lang.	86	28	32.6	49	57.0
English	102	51	50.0	65	63.7
All Fields	1929	655	34.0	712	36.9

*A delay of at least six months.

**One or more interruptions of at least six month's duration.

(b) incidence of interruptions was considerably higher than the total percentage of 36.9. More than one-half of the graduates in political science, economics, and the humanities fields reported one or more interruptions in graduate attendance, and only 50 per cent of English graduates proceeded directly into graduate school following college graduation.

(2) While a substantial proportion of engineering graduates (42.9 per cent) delayed entry, less than one-fourth reported interruptions in graduate attendance.

(3) Consistent with the ratings for "discontinuity of attendance" reported previously, incidence of interruptions in graduate attendance is closely related to median time-lapse, over fields.

Interruptions Following the Master's Degree

Although direct pursuit of the Ph.D. without taking any subdoctoral degree is possible (and encouraged by certain departments), for most recipients of the doctorate the master's degree is a normal concomitant of progress to the doctorate.

As noted earlier, almost 87 per cent of all respondents reported that they earned a master's degree en route to the Ph.D., and more than 95 per cent of humanities graduates did so. The direct Ph.D. was most prevalent among graduates in chemistry (roughly 21 per cent), psychology (19 per cent), other biosciences (18 per cent) and physics (about 18 per cent). It should be emphasized that these are fields with shorter average elapsed time to the doctorate.

Without regard to consideration of the relative merits of the direct pattern versus the "stepping stone" pattern, it is clear that completion of the master's program was followed by an interruption in progress to the doctorate for 35 per cent of all master's holders, representing 30.3 per cent of all graduates (see Table 4.3).

Some 49 per cent of master's holders in humanities, 37 per cent of those in social sciences, 33 per cent of those in biosciences, and 28 per cent of those in physical sciences interrupted following receipt of the master's degree; because of the smaller proportion of master's holders in physical science fields, the number of interruptions by master's holders represented only about 23 per cent of *all graduates*.

TABLE 4.3

Incidence of Interruptions in Graduate Study Following the Master's Degree, By Field

Field	N	Total in field with master's degree		Six months or more interrupted study after receiving master's		
		No.	Per cent	No.	% of master's holders	% of all graduates
Biosciences	336	300	89.3	100	33.3	29.8
Botany	101	92	91.1	26	28.3	25.7
Microbiology	85	80	94.1	28	35.0	32.9
Zoology	67	60	89.6	24	40.0	35.8
Other	83	68	81.9	22	32.4	26.5
Physical Sciences	844	695	82.3	197	28.3	23.3
Mathematics	131	112	85.5	42	37.5	32.1
Physics	124	102	82.2	30	29.4	24.2
Chemistry	414	328	79.2	83	25.3	20.0
Engineering	175	153	87.4	42	27.4	24.0
Social Sciences	418	364	87.1	135	37.1	32.3
Psychology	194	157	80.9	46	29.3	23.7
Sociology	101	97	96.0	41	42.3	40.6
Political Science	66	60	90.9	29	48.3	43.9
Economics	57	50	87.7	19	38.0	33.3
Humanities	331	315	95.2	153	48.6	46.2
History	143	139	97.2	64	46.0	44.8
Languages	86	74	86.0	35	47.3	40.7
English	102	102	100.0	54	52.9	52.9
All Fields	1929	1674	86.8	585	34.9	30.3

FACTORS ASSOCIATED WITH DELAYED ENTRY AND INTERRUPTIONS IN ATTENDANCE

Individuals who delayed entry into graduate school and those who reported interruptions in graduate attendance after receiving a master's degree were asked to indicate associated factors. Nine factors were designated for consideration at each level, including factors related to financial status and family obligations, military service, clarity of career goals generally and of specific graduate study goals, etc. A summary of responses by broad areas is provided in Table 4.4 (delayed entry into graduate school) and Table 4.5 (interruptions following the master's degree).

Reasons for Delayed Entry

(1) Some 30.4 per cent of all factors checked or written in (see Table 4.4) as influences on delayed entry into graduate school pertained either to *lack of adequate finances for a desired* program of study or to *family obligations* (22.4 per cent and 8.0 per cent, respectively). "A period of military service" accounted for about one-fifth of all factors checked.

(2) It is significant, however, that almost 37 per cent of the total number of responses checked relate to the area of *goal development* or to *clarity of purpose* [factors (d) through (g)]—general uncertainty regarding career plans, career plans at the time did not include graduate study, uncertainty regarding field of study, change in occupational plans. These factors accounted for some 43 per cent of all factors checked by social science graduates and some 41 per cent of those checked by bioscience graduates.

(3) *Desire for practical experience,* present for 17.6 per cent of all those delaying entry, was featured somewhat more prominently in the responses of humanities and physical science graduates.

(4) The small percentages associated with "advice or recommendations of others" [included in factor (i)] suggest that the matter of delaying entry into graduate school was little influenced by any pattern of formal or informal advisement favoring delay at the undergraduate level.

(5) While lack of adequate finances for a desired program of study was the most frequently designated *single* factor, con-

TABLE 4.4

Factors Associated With Delayed Entry Into Graduate School By Major Area

Factor	Number checking given factor as a per cent of all factors checked					Percent of those delaying entrance checking factor				
	Biol sci	Phys sci	Soc sci	Humanities	Total	Biol sci	Phys Sci	Soc sci	Humanities	Total
a. Inability to finance desired program	23.0	22.1	17.9	26.9	22.4	47.7	40.9	36.6	53.7	43.8
b. Family obligations	7.4	6.8	8.0	11.2	8.0	15.4	12.7	16.4	22.4	15.9
c. Military service	15.6	23.2	19.7	15.3	19.5	32.4	43.1	40.3	30.6	38.2
d. General uncertainty re career goals	20.0	14.2	19.7	15.3	16.7	41.4	26.4	40.3	30.6	32.7
e. Change in occupational plans*	1.3	1.8	2.6	2.6	2.0	2.7	3.3	5.2	5.2	4.0
f. Uncertainty re field of study	9.1	4.1	5.1	1.9	4.8	18.9	7.6	10.4	3.7	9.3
g. Plans did not include grad study	10.9	12.5	15.7	13.4	13.1	22.5	23.2	32.1	26.9	25.6
h. Desire for practical experience	6.5	10.5	5.5	11.6	9.0	13.5	19.6	11.2	23.1	17.6
i. Other designated factors**	3.0	1.8	3.3	1.5	2.2	6.3	3.3	6.7	3.0	4.4
j. Other write-in responses***	3.0	2.9	2.6	0.4	2.3	6.3	5.4	5.2	0.7	4.6
No. factors checked/ No. delaying entrance	230	512	274	268	1284	111	276	134	134	655
Per cent delaying entry into graduate school						33.0	32.7	32.1	40.5	34.0

*Indicates write-in response

**Advice or recommendation of others; health problems

***Awaiting veterans' benefits to come into effect; alien; felt obligations to do war work; etc.

Note: "Delay" defined as an interval of six months or more between receipt of bachelor's degree and entry into graduate school.

siderable weight should be attached to the evidence that a combination of factors related to the nature and clarity career and graduate study goals—general uncertainties regarding career orientation, absence of clearly established graduate study goals, etc.—accounted for over one-third of all factors checked and written in.

Reasons for Post-Master's Interruptions

(1) *Financial circumstances* and *family obligations* feature somewhat more prominently as factors associated with interruptions in attendance following receipt of the master's degree than as factors associated with delayed entry (compare Tables 4.4. and 4.5); at the entry level, these factors accounted for some 30.4 per cent of all factors checked while, as indicated in Table 4.5, they represent 41.2 per cent of all factors associated with post-master's interruption. *Military service* was less frequently involved at the later level.

(2) Significantly, however, factors related to the *development of relevant graduate study goals*—uncertainty regarding disciplinary interests, uncertainty regarding choice of institution, and absence of "doctorate orientation" [factors (e), (f) and (g)] continue to be important, together accounting for some 30.4 per cent of all factors checked.

(3) Of those master's holders who interrupted, 31.3 per cent considered the master's degree *to be terminal* at the time; variation over broad areas was slight, ranging from 30.4 per cent in biosciences to 32.2 per cent in humanities. However, the fact that the incidence of interruption varied markedly over areas should be recognized. Thus, it is clear that "lack of doctorate orientation," after completion of a master's program, was more generally characteristic of the humanities and social science groups as a whole than of the natural science groups.

(4) Desire or need for additional *practical experience* at this point in career development was a factor for less than 10 per cent of all interruptees but was indicated as a factor by 16.3 per cent of those in social science fields. A few individuals (6.3 per cent) indicated that dissatisfaction with the master's program was a factor; even fewer (2.1 per cent) suggested by their write-in responses that academic ennui was a factor.

Thus, as was true at the entry level, *financial considerations* and *family obligations* loomed large as factors associated with later interruptions in progress to the doctorate but the heavy

TABLE 4.5

Factors Associated with Interruptions in Graduate Study Following Receipt of the Master's Degree, By Major Area

Factor	Number checking given factor as a per cent of all factors checked					Per cent of those interrupting study checking factor				
	Biol sci	Phys sci	Soc sci	Human-ities	Total	Biol sci	Phys sci	Soc sci	Human-ities	Total
a. Inability to finance further graduate study	30.0	27.6	27.5	30.6	28.8	61.0	51.8	48.1	54.9	53.3
b. Family obligations	12.8	13.3	12.3	10.9	12.4	26.0	24.9	21.5	19.6	22.9
c. Period of full-time employment*	3.9	3.5	1.3	2.6	2.9	8.0	6.6	2.2	4.6	5.3
d. Period of military service	8.4	10.0	11.0	11.3	10.2	17.0	18.8	19.2	20.3	19.0
e. Uncertainty re doctoral field	6.9	5.7	2.5	4.7	5.0	14.0	10.6	4.4	8.5	9.2
f. Uncertainty re doctoral inst	11.3	7.3	8.5	8.0	8.5	23.0	13.7	14.8	14.4	15.7
g. Master's considered terminal	14.8	17.1	17.4	17.9	16.9	30.0	32.0	30.4	32.2	31.3
h. Additional practical experience needed or desired*	3.0	3.8	9.3	4.4	5.0	6.0	7.1	16.3	7.8	9.2
i. Tired of academic routine*	0.0	0.5	0.4	3.3	1.1	0.0	1.0	0.7	5.9	2.1
j. Dissatisfaction with master's program	3.9	4.4	3.8	1.4	3.4	8.0	8.1	6.7	2.6	6.3
k. Other designated factors**	3.4	2.7	3.0	2.2	2.8	7.0	5.1	5.2	3.9	5.1
l. Other write-in responses***	1.5	4.1	3.0	2.6	3.0	3.0	7.6	5.2	4.6	5.5
No. factors/no. interrupting	203	369	236	274	1082	100	197	135	153	585
Per cent of master's-holders interrupting						33.3	28.3	37.1	48.6	34.9

*Indicates write-in response

**Advice or recommendation of others; health problems

***Application not accepted; doubted ability; doctoral program discontinued at university; etc.

component of factors related to the area of *goal development* must be considered quite significant. It is evident that graduates in the natural sciences as compared to social science and humanities graduates tended to become "doctorate oriented" earlier in their total program of graduate studies.

INSTITUTIONAL ATTENDANCE AND DEGREE PATTERNS

As noted earlier in this chapter, information provided by graduates regarding graduate institutions attended and subdoctoral degrees earned permits an examination of certain broad institutional attendance and degree patterns which have some relevance in the context of "continuity versus discontinuity" of progress to the doctorate. While neither direct pursuit of a Ph.D. bypassing the master's, nor completion of all work at one institution can be assumed to be educationally desirable patterns, it is clear that, other things being equal, the likelihood of programmatic continuity is somewhat enhanced in these circumstances. Examination of the major institutional attendance and degree patterns shown in Table 4.6 reveals that there are differences among the fields with regard to these patterns.

(1) Approximately one-half of all graduates reported attendance at only *one graduate institution*. Some 39 per cent of the sample attended only one graduate institution *and* took the master's degree, and about 12 per cent of the sample followed the same institutional attendance pattern but did *not* take the master's.

(2) The second most frequent pattern was attendance at only two graduate schools with a master's degree from the first, and a Ph.D. from the second, a pattern followed by 31.8 per cent of all graduates.

(3) Individuals who attended two or more graduate schools but who reported *some non-degree work* at one or more of these institutions accounted for 17.3 per cent of the total. By inspection of the data in Table 4.6, it is evident that this "irregular" pattern tended to be most prevalent among humanities graduates (roughly 29 per cent) and social science graduates (20 per cent) and least prevalent among natural science graduates (about 13 per cent). Almost 42 per cent of graduates in foreign languages followed this pattern, a phenomenon which is explicable, in part, in terms of the nature of study in this field.

TABLE 4.6

Major Institutional *Attendance and Degree Patterns, By Field*
(in per cent)

		Attended only one graduate school		Attended only two graduate schools	Attended two or more graduate schools
Field	N	M.A. & Ph.D.	Ph.D. only	M.A. at first and Ph.D at second	Some non-degree study at one or more
Biosciences	336	38.7	9.5	39.0	12.8
Botany	101	38.6	7.9	38.6	14.9
Microbiology	85	50.6	7.1	32.9	9.4
Zoology	67	28.4	6.0	55.2	10.4
Other	83	34.9	16.9	32.5	15.7
Physical Sciences	844	42.9	16.2	27.5	13.4
Mathematics	131	32.8	16.0	23.7	27.5
Physics	124	34.7	15.3	34.7	15.3
Chemistry	414	44.4	18.1	27.1	10.4
Engineering	175	52.5	12.6	26.3	8.6
Social Sciences	418	30.4	12.2	37.5	19.8
Psychology	194	29.4	19.1	34.5	17.0
Sociology	101	33.7	3.0	34.6	28.7
Pol. Sci.	66	28.8	6.0	50.0	15.2
Economics	57	29.8	12.3	38.6	19.3
Humanities	331	40.5	2.4	28.4	28.7
History	143	46.2	2.8	27.9	23.1
F. Lang.	86	30.2	4.6	23.3	41.9
English	102	41.2	—	33.3	25.5
All Fields	1929	39.1	11.8	31.8	17.3*

*By degree pattern within this attendance pattern the breakdown (for the total sample) is 1.4 per cent with Ph.D. only and 15.9 per cent with the master's degree; 12.9 per cent with MA and Ph.D. at different institutions; and 3.0 per cent with master's and Ph.D. at same institution.

(4) Significantly, ranks of fields in respect to incidence of "irregular" attendance patterns correspond relatively closely to ranks for mean entry-PHD time lapse over fields (rho = .77).[2]

GENERAL OBSERVATIONS

The evidence presented in this examination of delays and discontinuities in progress to the doctorate and of some of the associated factors points up several important facts:

(1) Relatively few of the recent graduates (only about 30 per cent) were definitely committed to "working toward a doctorate" at the time they completed their undergraduate programs and more than one-fourth of them were not committed to "graduate study" as a personal goal.

(2) For many individuals, "working toward the doctorate degree" was not a definite goal even after completion of the master's program.

(3) Factors related to development of relevant graduate study and degree goals account for some of the delays and discontinuities in progress. The evidence presented suggests that graduates in the natural sciences (fields with shorter elapsed time averages) tended to become "doctorate oriented" earlier than did graduates in several social science and humanities fields (fields with longer average time lapse). However the relationship over fields between "goal development" and duration is not high.

(4) The fact that "working toward the doctorate" tends to be an *emergent goal* rather than an early-established, directive goal is pointed up in these data. This fact has implications for any "total" attack on the problem of "reducing" average time taken to attain the degree. Substantial importance must be attached to the general area of goal development in accounting for delayed entry into graduate school and for interruptions in attendance following matriculation.

(5) The fact that completion of the master's program represents a "natural" point for interruption in attendance should be recognized. The question of "direct" pursuit of the doctorate versus the master's-doctorate pattern would appear to be one which may assume greater importance than it has been accorded

---

[2] Davis (1962, p. 103) reports that Ph.D. students who changed schools "appear greatly retarded in their degree progress."

in most discussions of the duration question. It has been shown that the "irregular" institutional attendance and degree pattern tends to be associated with median time-lapse to the doctorate over fields. It is also seen to be more characteristic of social science and humanities fields than of natural science fields.

(6) Finally, factors related to the financial status of the individuals and to family obligations are clearly associated with delayed entry into graduate school and interruptions in graduate attendance following entry. However, on the basis of the evidence which has been reviewed we must conclude that alleviation of the "financial problems" of graduate students is a necessary but not a sufficient condition for reducing "delays and discontinuities" in progress to the doctorate.

CHAPTER V

Patterns of Financial Assistance and Support

For many candidates the predoctoral period was characterized not only by concerns and activities related to the acquisition of knowledge and degrees, but also by those related to the acquisition of dependents. At the time of entry into graduate school, some 61 per cent of the graduates (see Table 5.1) had *no dependents;* by the time the doctorate had been earned three-fourths of them had acquired at least one dependent, and more than one-half (52.7 per cent) had acquired at *least two dependents.*[1]

In view of the fact that "earnings of spouse" ranked fifth in importance among thirteen potential sources of financial support, these acquisitions should not be thought of as *necessarily* constituting "delaying factors." However, the record revealed in Table 5.1 gives added emphasis to the already established importance of "family obligations" and "financial problems" as factors which affected time taken to earn the doctorate (and which, quite naturally, may tend to become more pronounced as more time is taken!)

What were the major sources of financial support during the period of graduate study? What types of graduate appointments were held, and for how long? What differences obtained among the various fields? Evidence regarding these and related questions is presented in this chapter.

MAJOR SOURCES OF ASSISTANCE AND SUPPORT

Thirteen potential sources of financial support for graduate study were designated in the questionnaire (see Appendix A)

---

[1] Interpretation of the somewhat smaller percentages of graduates in English and foreign languages reporting "dependents" should be conditioned by the fact that some 23 per cent of these graduates were women as compared to a percentage of about 6 per cent in the total sample.

TABLE 5.1

Number of Dependents Reported: Percentage Distribution

Field	At time of graduate matriculation			At time doctoral phase of study was initiated			At time doctorate was conferred		
	None	One	Two or more	None	One	Two or more	None	One	Two or more
Biosciences	(57.7)	(25.6)	(16.7)	(37.2)	(24.1)	(38.7)	(25.3)	(19.0)	(55.7)
Botany	58.4	22.8	18.8	35.6	25.7	38.6	26.7	15.8	57.4
Microbiology	62.4	25.9	11.8	43.5	20.0	36.5	30.6	16.5	52.9
Zoology	50.7	33.3	20.9	29.8	23.9	46.3	16.4	20.9	62.7
Other	57.8	26.5	15.7	38.6	26.5	34.9	25.3	24.1	50.6
Physical Sciences	(62.1)	(22.7)	(15.2)	(39.4)	(28.4)	(32.3)	(25.5)	(23.3)	(51.2)
Mathematics	67.2	19.1	13.8	37.4	29.8	32.9	25.2	19.1	55.7
Physics	66.9	22.6	10.5	38.7	29.8	31.4	22.6	19.4	58.0
Chemistry	65.5	20.3	14.3	44.2	29.7	26.1	29.2	26.8	44.0
Engineering	46.9	31.4	21.7	30.3	23.4	46.3	18.8	21.1	60.0
Social Sciences	(54.1)	(28.9)	(17.0)	(32.3)	(31.8)	(35.9)	(16.7)	(23.2)	(60.1)
Psychology	55.7	29.4	14.9	32.5	37.1	30.4	16.5	28.4	55.1
Sociology	55.4	28.7	15.9	33.7	28.7	37.6	20.8	19.8	59.4
Political Science	48.5	34.8	16.6	34.8	21.2	43.9	18.2	15.2	66.6
Economics	52.6	21.1	26.3	26.3	31.6	42.1	8.8	21.1	70.3
Humanities	(67.7)	(18.7)	(13.6)	(46.8)	(26.9)	(26.3)	(32.3)	(23.3)	(44.4)
History	67.1	18.9	13.3	41.3	28.7	30.1	23.8	28.7	47.6
Languages	71.3	16.1	12.6	52.9	23.0	14.1	37.9	18.4	43.6
English	64.7	20.6	14.7	49.0	27.5	23.5	39.2	19.6	41.1
All Fields	60.6	23.9	15.6	38.7	28.1	33.1	24.7	22.5	52.7

to be rated as of "major," "moderate," or "slight" importance, or as of "no importance," by period of graduate study—i.e., during the beginning or master's phase (first year) and during the advanced or post-master's phase (second and subsequent years).

The percentage distribution of ratings for the several sources *in the entire sample* is shown in Table 5.2.

(1) Over the entire period of graduate study, the most important sources of support were, in order of rated importance: veteran's benefits, teaching assistantships, research assistantships, personal savings, earnings of spouse, fellowship grants, employment not related to the graduate program, direct assistance from family, and graduate appointments other than teaching or research assistantships. Very few individuals reported "loans," "independent income" or "educational trust fund," as sources of financial assistance.[2]

(2) Several sources increased in importance during the graduate years: *research assistantships, fellowship grants,* and *earnings of spouse* were considerably more important during the second and subsequent years of study than during the first year.

(3) *Teaching assistantships,* the most important single source during the post-master's period, was the second-ranked source of support during the earlier period as well.

(4) Although *veteran's benefits* remained a source of major importance throughout, this source was somewhat less important after the first year, and *direct support from the family* diminished sharply in importance after the first year.

(5) *Personal savings* were relied upon to about the same extent during both periods, ranking third in importance during the earlier period of study and fourth in importance during the later period.

Employment *not related* to the graduate program, seventh-ranked among all sources, did not change in importance; graduate appointments other than teaching or research, ninth-ranked, were of major or moderate importance for 8.5 per cent during the first year and 11.1 per cent during the second and subsequent years.

---

[2] In evaluating these findings it should be kept in mind that this research was completed before the advent of the National Defense Education Act with its provisions affecting student finances. For comparable findings in a national sample, see Davis (1962).

TABLE 5.2

Ratings of Importance, as Sources of Support During Beginning and Advanced Stages of Study, Respectively, of Designated Factors: Total Sample

Source of financial support	Percentage distribution of responses									
	Major importance		Moderate importance		Slight importance		No support from source		Item not rated	
	Beg.	Adv.	Beg.	Adv.	Beg.	Adv.	Beg.	Adv.	Beg.	Adv.
Veteran's benefits	35.0	24.5	7.9	11.2	1.6	4.5	36.6	39.7	18.9	20.0
Teaching assistantship	23.1	27.6	10.8	14.4	3.3	6.0	39.6	31.5	23.1	20.6
Research assistantship	12.2	24.6	6.0	8.7	3.0	4.4	49.6	37.5	29.2	24.8
Personal savings	12.2	9.4	13.9	13.9	24.5	20.1	28.7	34.1	20.6	22.6
Earnings of spouse	11.1	18.8	8.9	12.9	4.2	8.1	48.8	36.9	27.1	23.3
Fellowship grants	6.5	17.6	3.7	7.6	1.2	3.5	58.3	45.2	30.1	26.1
Employment (not related to graduate program)	8.1	10.2	8.3	7.2	11.1	10.2	45.3	43.6	27.2	28.9
Family	10.2	4.0	10.8	7.0	16.0	16.0	38.8	45.0	24.2	28.0
Other graduate appointments	4.6	6.9	3.9	4.2	2.6	2.7	58.2	54.6	30.7	31.6
Other loans	1.1	1.7	2.1	3.2	2.8	4.0	62.2	59.0	31.9	32.0
Independent income	1.1	1.1	0.7	1.3	2.3	3.6	64.4	62.0	31.5	31.9
University loan funds	0.3	0.3	0.8	1.3	2.1	2.9	64.3	62.8	32.4	32.6
Educational trust fund	0.4	0.3	0.3	0.1	0.6	0.3	66.6	66.0	32.2	33.3

Importance of Sources by Major Areas

Certain differences among the broad areas in patterns of importance of the various sources are discernible in Table 5.3.

(1) *Teaching assistantships* were of major importance during both the beginning *and* advanced stages of graduate study for natural science graduates; they were least important for social science graduates. For humanities graduates they became a source of pronounced importance primarily during the second and subsequent years of study.

(2) *Research assistantships,* notably unimportant as sources of support for humanities graduates, were more often judged to be important during the advanced period of study in all areas. However, in the natural sciences, they were relatively important during the beginning period of study as well. For the sciences, the research assistantship was rated as the most important single source of support during the advanced period.

(3) Significantly, *personal savings,* direct support from *family,* and *employment not related to the graduate program,* were relatively *more important for social sciences and humanities* graduates *than for natural science graduates.* (It should be recalled here that in the former areas a higher percentage of the graduates were women.)

(4) *Fellowship grants,* not featured prominently during the earlier period of study in any area, were somewhat more important during the advanced period for physical science graduates than for graduates in other areas.

(5) In general, veteran's benefits were judged to have been more important during the *entire period* of graduate study by social science and humanities graduates than by science graduates, reflecting somewhat higher incidence of military service *during the predoctoral period* among graduates in the former fields (see Table 2.6, Chapter II).

GRADUATE APPOINTMENTS

The ratings which have been reviewed point up the importance of graduate appointments, particularly research and teaching assistantships, as sources of financial support during the

TABLE 5.3

Percentage of Graduates, By Broad Academic Areas, For Whom Designated Sources of Support Were of Major Importance*

Sources of support	Biosciences		Physical Sciences		Social Sciences		Humanities		All Fields	
	Beg.	Adv.	Beg.	Adv.	Beg.	Adv.	Beg.	Adv.	Beg.	Adv.
Veterans' benefits	36	24	31	18	46	32	30	31	35	24
Teaching assistantships	25	30	32	27	9	20	14	37	23	28
Research assistantships	21	33	14	31	10	20	2	6	12	25
Earnings of spouse	13	20	10	17	14	22	8	20	11	19
Fellowship grants	7	17	7	21	6	13	7	15	7	18
Personal savings	13	8	10	7	13	11	18	15	12	9
Employment (not related to graduate program)	6	10	7	12	11	8	10	8	8	10
Direct assistance from family	8	3	9	3	9	3	18	7	10	4
Graduate appointments (not elsewhere listed)	2	2	4	5	7	17	5	4	5	7

*All percentages rounded to the nearest whole per cent. Thus, for example, 25 per cent of bioscience graduates indicated that teaching assistantships were of major importance during the first year or pre-master's phase of graduate study.

period of graduate study. In addition to rating these sources in terms of degree of importance, graduates were asked to provide information regarding graduate appointments held, the number of semesters and/or quarters during which they were employed in each, and the number of terms during which they were employed half-time or more in each type of appointment.

Types and Combinations Reported

Some 86 per cent of all graduates reported that they held some type of graduate appointment (see Table 5.4); percentages by field ranged downward from more than 90 per cent in microbiology and chemistry to roughly 73 per cent in history. In the total sample, some 34 per cent reported teaching assistantships *only*, 23 per cent reported research *and* teaching appointments, 15 per cent research *only*, and some 5 per cent reported "other" only [e.g., dormitory supervision, laboratory assisting (not designated as teaching), student advising, "clinical" (largely in psychology), assistant in museum, and the like]. About 8 per cent reported combinations of appointments involving the "other" category with teaching and/or research. Differences among the fields with respect to the distribution of the various types of appointments are apparent.

(1) Only roughly 15 per cent of humanities graduates reported a research appointment but more than one-half reported a teaching appointment *only*. In six of the eight science fields at least 50 per cent of graduates held a *research appointment;* this percentage was reached by only two of the seven other fields (sociology and economics). The relationship over the 15 fields between percentage reporting *research* appointments and elapsed time to the doctorate was *negative* (rho = –.55).

(2) In all the science fields except mathematics—a field characterized by "longer" elapsed time to the doctorate *and* the third highest percentage of graduates reporting teaching appointments *only*—one-fifth or more of the graduates reported that they held *both* teaching and research assistantships. Except for sociology, with 20.8 per cent of graduates reporting this combination, *none* of the social science or humanities fields was characterized by as high a proportion of graduates with both types of appointments (e.g., only some 7 per cent of humanities graduates held both types.)

There is an inverse relationship, over fields, between percentage reporting both teaching *and* research appointments, and

TABLE 5.4

Types and Combinations of Graduate Appointments Reported: Percentage Distribution By Field

Field	None reported	Research only	Teaching only	Other only	Research & teaching	Research & other	Teaching & other	Teaching, research & other
Biosciences	(12.8)	(19.3)	(28.3)	(3.0)	(30.4)	(2.1)	(1.8)	(2.4)
Botany	15.8	29.7	22.8	3.0	23.8	2.0	1.0	2.0
Microbiology	8.2	23.5	23.5	1.2	36.5	2.4	1.2	3.5
Zoology	11.9	7.5	31.3	1.5	43.3	3.0	—	1.5
Other Biosciences	14.4	12.0	37.3	6.0	21.7	1.2	4.8	2.4
Physical Sciences	(12.0)	(16.2)	(34.7)	(2.7)	(29.6)	(0.9)	(2.0)	(1.8)
Mathematics	10.7	13.7	49.6	3.0	16.8	—	3.8	2.3
Physics	17.7	12.9	25.8	1.6	37.9	0.9	1.6	1.6
Chemistry	8.7	14.0	36.2	1.4	34.3	1.0	2.2	2.2
Engineering	16.6	25.7	26.3	6.3	22.3	1.7	0.6	0.6
Social Sciences	(16.0)	(16.5)	(21.5)	(11.5)	(17.7)	(5.3)	(6.9)	(4.5)
Psychology	18.0	9.8	18.0	18.6	16.5	4.1	8.8	6.2
Sociology	13.9	31.7	14.8	5.0	20.8	7.9	2.0	4.0
Political Science	15.2	4.5	39.4	6.1	16.7	4.5	10.6	3.0
Economics	14.0	26.3	24.6	5.3	17.5	5.3	5.3	1.8
Humanities	(19.0)	(6.6)	(52.9)	(6.6)	(7.3)	(0.6)	(6.0)	(0.9)
History	27.3	10.5	32.9	13.3	7.0	0.7	6.3	2.1
Foreign Languages	11.6	4.6	72.1	2.3	7.0	—	2.3	—
English	13.7	2.9	64.7	1.0	7.8	1.0	8.8	—
All Fields	(14.2)	(15.2)	(33.9)	(5.3)	(23.3)	(2.0)	(3.7)	(2.3)

Note: Row totals equal 100.0 per cent within limits of rounding error.

median entry-PHD time lapse (rho = —.62). It is evident that fields in which more graduates held *research assistantships* and fields in which more graduates held *both* research *and* teaching appointments tended to be fields characterized by *shorter* elapsed time to the doctorate.

(3) A *teaching assistantship* was reported by roughly 51 per cent of all social science graduates as compared to 63 per cent of bioscience graduates, 67 per cent of humanities graduates, and 69 per cent of physical science graduates. It will be recalled that the ratings of teaching assistantships as "lengthening" influences also followed this pattern.

Duration of Graduate Appointments

Differences among the fields with respect to the mean number of semesters during which those holding various types of appointments were employed are apparent in Table 5.5 (duration of teaching appointments) and Table 5.6 (duration of research appointments). And, with respect to the percentages of graduates for whom such appointments involved one-half time or more there are also interesting differences among the fields (see Table 5.7).

(1) Of particular significance is the fact that the mean duration of graduate appointments (both teaching and research) tended to be *greater* in the science fields than in other fields; particularly in the case of research assistantships was this true. In seven of eight science fields, the mean duration of research employment was roughly *six semesters or more* (range for the seven fields, in calendar year equivalent, was from 2.2 years to 2.6 years). In all other fields, duration of research employment was typically less than 2.0 calendar years (about five semesters). If it is noted that most of the science means (Table 5.6) are based on *more than one-half of all graduates,* while only two of the "non-science" means involve so high a percentage, it is clear that proportionately more science graduates *were supported in research appointments, over a longer period of time.*

(2) At the same time, science graduates in very substantial numbers were involved in teaching assistantships (Table 5.5)—typically, for about *five* to over *seven* semesters.

(3) Less than 30 per cent of the graduates (see Table 5.7) reported that they held any type of appointment requiring more than one-half time. However, about one-half of those in mathematics (48.9 per cent) did so, with one-third of these graduates

TABLE 5.5

Time During Which Graduates Were Employed in Teaching Assistantships, By Field

Field	Reporting employment as teaching ass't.		Mean duration of employment*	
	No.	Per cent	In calendar yrs.	In semesters
Biosciences	212	63.1	2.1	5.6
Botany	51	50.4	2.1	5.6
Microbiology	55	64.7	2.0	5.3
Zoology	51	76.1	2.1	5.6
Other Biosciences	55	66.3	2.2	5.9
Physical Sciences	583	69.1	2.1	5.6
Mathematics	95	72.5	2.8	7.5
Physics	83	67.0	1.8	4.8
Chemistry	318	76.8	2.1	5.6
Engineering	87	49.7	1.8	4.8
Social Sciences	212	50.7	1.5	4.0
Psychology	96	49.5	1.4	3.7
Sociology	42	41.6	1.4	3.7
Political Science	46	69.7	1.8	4.8
Economics	28	49.1	1.8	4.8
Humanities	222	67.1	2.1	5.6
History	69	48.2	1.6	4.3
Foreign Languages	70	81.4	2.8	7.5
English	83	81.4	1.8	4.8
All Fields	1229	63.7	2.0	5.3

*Respondents reported the total number of semesters and/or quarters during which they were employed as teaching assistants. Calendar year equivalents were determined.

TABLE 5.6

Time During Which Graduates Were Employed in Research Assistantships, By Field

Field	Reporting employment as research ass't.		Mean duration of employment*	
	No.	Per cent	In calendar yrs.	In semesters
Biosciences	182	54.2	2.4	6.4
Botany	58	57.4	2.6	6.9
Microbiology	56	65.9	2.6	6.9
Zoology	37	55.2	1.9	5.1
Other Biosciences	31	37.3	2.3	6.2
Physical Sciences	410	48.6	2.3	6.1
Mathematics	43	32.8	2.2	5.8
Physics	66	53.2	2.2	5.9
Chemistry	213	51.4	2.3	6.1
Engineering	88	50.3	2.4	6.4
Social Sciences	184	44.0	1.6	4.3
Psychology	71	36.6	1.4	3.7
Sociology	65	64.4	1.9	5.1
Political Science	19	28.8	1.1	2.9
Economics	29	50.9	1.9	5.1
Humanities	51	15.4	1.1	2.9
History	29	20.3	1.0	2.7
Foreign Languages	10	11.6	0.9	2.4
English	12	11.8	1.6	4.3
All Fields	827	42.9	2.1	5.6

*Respondents reported the total number of semesters and/or quarters during which they were employed as research assistants. Calendar year equivalents were determined.

TABLE 5.7

Percentage of Respondents, By Field, Reporting Periods During Which More than One-Half Time Was Devoted to Graduate Appointments

Field	Total*	Employed more than one-half time during one or more terms		
		Teaching appointment	Research appointment	Other type of appointment
Biosciences	28.6	13.4	18.2	1.5
Botany	23.8	8.9	16.8	2.0
Microbiology	35.3	16.5	24.7	1.2
Zoology	32.8	19.4	14.9	0.0
Other Biosciences	24.1	10.8	15.7	2.4
Physical Sciences	33.4	19.5	16.1	3.2
Mathematics	48.9	32.8	13.0	3.8
Physics	29.0	17.7	15.3	3.2
Chemistry	28.7	18.1	15.4	2.4
Engineering	26.0	15.4	20.6	4.6
Social Sciences	28.2	10.0	12.4	11.0
Psychology	28.9	7.7	9.3	17.9
Sociology	28.7	5.0	20.8	5.9
Political Science	22.7	19.7	4.5	4.5
Economics	31.6	15.8	17.5	3.5
Humanities	17.8	15.1	2.7	0.0
History	9.1	7.0	2.1	0.0
Foreign Languages	30.2	27.9	2.3	0.0
English	19.6	15.7	3.9	0.0
All Fields	28.8	15.6	11.2	4.0

*Indicates percentage of respondents reporting that during one or more academic terms they devoted more than one-half time to a graduate appointment, and may be less than the sum of percentages in the last three columns since some individuals are reported in more than one category.

reporting at least *one term* during which they were employed on a half-time basis in a teaching appointment. Interestingly enough, the percentages of "half-time" appointments for science graduates generally are slightly higher than those for graduates in the other fields but differences among the individual fields *within* the various areas should also be noted.

FELLOWSHIP GRANTS

Among the thirteen sources of financial support examined earlier, "fellowship grants" (defined as outright grants not calling for specified duties) was fifth-ranked as a source of support during the "advanced" period of graduate study. Some 38.7 per cent of all graduates reported receiving one or more such grants during their graduate careers (see Table 5.8). It is interesting to note that 43.2 per cent of humanities graduates reported fellowships as compared to some 40.2 per cent in physical sciences, 35.6 per cent in social sciences, and 34.5 per cent in biosciences. However, in general, it is evident from the data in Table 5.8 that the *average total value* (shown in hundreds of dollars) of fellowships received was markedly higher for science fields than for other fields. For graduates in social sciences and humanities who received fellowships, mean values were approximately $2000 and $1900, respectively, whereas for fellowships in natural sciences mean values were approximately $3360 for bioscience graduates and $3000 for physical science graduates.

SUMMARY OF MAJOR TRENDS

(1) The *teaching assistantship* was the most important *single* source of support during the *advanced period* of graduate study, followed closely in importance by veteran's benefits, the research assistantship, and earnings of spouse.

(2) In the science fields, teaching and research assistantships were important during *both* beginning and advanced periods of study; research appointments were notably unimportant for *humanities* graduates.

(3) Reliance for support on personal savings, direct support from family, and employment not related to the graduate program, was more characteristic of social sciences and humanities graduates than of science graduates.

TABLE 5.8

Financial Support from Fellowship Grants, by Field (1950-1958)

Field	Number reporting designated total amounts (in hundreds of $'s)												Mean amount reported (in hundreds)	
	Reporting fellowship(s)*		Total amount reported											
	No.	%	Not given	Below 10	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80 plus	Recipients only**	All graduates
Biosciences	116	34.5	11	24	15	12	15	14	11	5	5	4	$33.6	$10.5
Botany	29	28.7	3	5	7	3	2	2	2	2	1	2	35.8	9.2
Microbiology	23	27.1	2	3	1	2	6	4	2	—	2	1	38.8	9.6
Zoology	20	29.9	2	3	—	3	2	5	2	2	1	—	38.9	10.4
Other Biosciences	44	53.0	4	13	7	4	5	3	5	1	1	1	27.0	13.0
Physical Science	339	40.2	15	39	81	60	72	25	22	11	6	8	30.0	11.5
Mathematics	33	25.2	2	9	6	7	5	—	1	—	1	2	25.6	6.1
Physics	36	29.0	1	7	9	5	6	1	6	—	—	1	28.1	7.9
Chemistry	184	44.4	9	19	42	39	44	15	10	4	1	1	27.9	11.8
Engineering	86	49.1	3	4	24	9	17	9	5	7	4	4	36.9	17.5
Social Science	149	35.6	12	60	26	17	16	6	6	4	1	1	19.8	6.5
Psychology	41	21.1	5	16	11	4	3	—	1	—	—	1	16.9	3.1
Sociology	40	39.6	5	15	6	6	5	—	2	1	—	—	19.0	6.6
Political Science	43	65.7	1	10	9	7	6	4	3	3	—	—	26.4	16.8
Economics	25	43.9	1	19	—	—	2	2	—	—	1	—	13.8	5.8
Humanities	143	43.2	4	49	43	21	14	4	2	3	2	1	18.9	7.9
History	70	49.0	0	23	30	8	5	1	1	1	—	1	17.0	8.3
Foreign Languages	36	41.9	0	10	11	5	5	2	1	1	1	—	22.2	9.3
English	37	36.3	4	16	2	8	4	1	—	1	1	—	19.2	6.2
All Fields	747	38.7	42	172	165	110	117	49	41	23	14	14	26.4	9.6

*Respondents were asked to report number and total value of "fellowship grant(s) not calling for specific duties—outright grants."

**Those reporting amount received, only.

(4) The majority of graduates in every field held some type of graduate appointment, mostly in teaching or research (more than three-fourths of all graduates reported one or both types).

(5) Over fields, *incidence of research appointments,* and incidence of teaching plus research appointments, were both negatively correlated with median matriculation-to-doctorate time lapse (rho = -.55 and -.62, respectively). Thus fields in which more graduates held research appointments and fields in which more graduates held *both types* of appointments tended to be the fields characterized by lower elapsed time medians.

(6) In general, duration of graduate appointments (teaching and research) in the science fields tended to be greater than in the other fields; most pronouncedly so in the case of research assistantships. In essence, as compared to graduates in other fields, *more science graduates were supported in research and in teaching appointments over a longer period of time.*

(7) Fellowship grants were fifth-ranked in importance during the advanced period of study and were somewhat more frequently reported by humanities graduates. However, the total average value of grants received was greater in bioscience fields (mean amount reported was about $3360) and in the physical science fields ($3000) than in the humanities and social science fields ($1900 and $2000, respectively).

The Teaching Assistantship: A Special Case

It may be recalled that the teaching assistantship was quite frequently reported to have been a "lengthening factor" whereas the research assistantship was seldom associated with "length." Yet, both types of appointments were highly important sources of financial support during the graduate years.

By correlating the rated "lengthening effect" of the two types of appointment, by field (using percentages shown in Chapter III), with the percentage of graduates in each field who actually held each type of appointment, it is made clear that, in the case of "teaching appointments," rated "lengthening effect" is *closely* associated with *incidence* over fields (rho = .91) but that in the case of "research appointments," the relationship with incidence over fields is much less pronounced (rho = .54)

The consistency with which "incidence" of the teaching assistantship is associated with its rated "lengthening" effect over the fifteen fields included in this study is notable, as is the *absence* of an equally close relationship between these variables (incidence vs. "lengthening" effect) in the case of the research assistantship.

In view of the nature of these findings it may be inferred that, with respect to their relationship *to the completion of doctoral requirements,* teaching and research assistantships were perceived by graduates as having had somewhat different functional roles: hypothetically, the role of the teaching assistantship was perceived as *sustaining* (financially) *but not directly instrumental,* whereas the research assistantship was perceived as *both sustaining and directly instrumental,* particularly with respect to development and implementation of a thesis project, as we shall see later.

This represents, of course, only one possible rationalization of these findings, and the teaching appointments may be thought of as having had important educational value (in training for teaching) in addition to their obvious value as sources of financial assistance to graduate students.

In this connection, however, it should be noted that in certain fields in which very substantial percentages of graduates reported full-time predoctoral employment in college teaching (English, foreign languages, political science, mathematics and history) very substantial percentages also held graduate teaching assistantships.

For example, over seven of ten English and foreign language graduates were employed *full-time* in college teaching during the predoctoral period (an average of around 4.0 years, based on *all* graduates in these fields) and more than eight in ten were also employed in graduate teaching assistantships, *for five* to *seven semesters,* on the average.

On the other hand, in several other fields (chemistry, psychology, botany, microbiology, and engineering) it will be recalled that relatively small percentages of graduates gained full-time college teaching experience during the predoctoral period and very few reported teaching duties in postdoctoral employment, yet substantial percentages *were* employed in graduate teaching appointments (ranging from about 50 per cent to over 75 per cent).

The possibly duplicative nature of the full-time and assistantship teaching experience for students in certain fields, particularly the humanities and one or two social science fields, may be a factor in their assessment of the teaching assistantship as a "lengthening" influence. On the other hand, in the natural sciences many of the students holding teaching assistantships may not have been primarily interested in teaching and perhaps thought of their work in such positions as "inappropriate for their professional futures."[4] In any event, these data suggest that the "training" versus the "supportive" functions of the teaching assistantship should be considered carefully.

---

[4] In a national sample of arts and sciences graduate students, Davis (1962, pp. 71-72) found that most students holding assistantships tended to give them relatively high ratings in terms of training value. Natural science students endorsed the training value of teaching assistantships somewhat less frequently than did those in the humanities, however.

CHAPTER VI

The Dissertation Requirement

Under the caption, "Ends His Thesis at 71, Worked on It 30 Years," the following brief story appeared in *The New York Times* of July 11, 1960:

> Fanch Gourvil, 71 years of age, has finally presented his thesis to the professors at Morlaix, Belgium, according to La Province of Mons, as reported by NANA.
>
> He has been preparing it for thirty years, during which he covered thousands of miles on his bicycle to prove that Hersart de la Villemarque composed most of the folk songs of his neighborhood.

Now it is probable that few recipients of a Ph.D. have been called upon either to pedal as many miles or to search quite so long for relevant data in order to complete a dissertation. However, it is widely recognized that involvement with the research requirement, which constitutes the ultimate challenge for a Ph.D. candidate, is often a quite prolonged affair and that the "gestation period" for dissertations does not conform to standard laws.

It may be recalled that respondents rated "off-campus" completion of this requirement (implicitly, "delayed" completion), and factors inherent in the nature of the research problem among the five leading factors influencing time taken to attain the doctorate. Moreover, those fields in which a longer time lapse occurred between beginning graduate study and conferral of the degree were also fields in which many graduates rated the off-campus dissertation as a lengthening influence.

The graduates' ratings are sufficient to point up the potential "lengthening influence" of the dissertation and the conditions under which it is completed. It is important, in addition, to examine the "record" as reported by them in order to obtain answers to several relevant questions:

1. When was the dissertation topic formally approved?
2. How much progress had been made on the dissertation at the time formal course and residence requirements for the doctorate had been completed?
3. How much time elapsed between formal approval of the topic and submission of the dissertation?
4. How much time was spent in full-time employment and in residence, respectively, after formal approval of the topic?

TIMING OF FORMAL APPROVAL OF TOPIC

Although work related to the dissertation may be undertaken before the topic is approved, formal agreement regarding the topic represents a matter of some psychological and practical significance, since until this issue is *formally* joined, individuals proceed in the face of considerable uncertainty.

Respondents were asked to report the number of terms (semesters and/or quarters) of attendance at a graduate institution completed prior to the term during which they gained formal approval of a dissertation topic. These data were converted into calendar year equivalent, and are summarized in Table 6.1.

(1) The typical individual in the sample obtained formal approval of the dissertation topic after having been in attendance as a graduate student, though not necessarily on a continuous basis, for 2.6 years (roughly seven semesters). There is relatively little variation over fields around this typical value, although in mathematics and physics the typical individual had been in attendance roughly *three* calendar years before a topic was approved. A higher percentage of the total sample (37.7 per cent) reported at least 3.0 years than reported less than 2.0 years (28.5 per cent); less than one-fifth of mathematics and

TABLE 6.1

Years of Graduate Attendance Completed Prior to Time of Formal Approval of Dissertation Topic in Relation to Total Years, by Field

Field	Median years of graduate attendance*		Per cent reporting designated number of years prior to topic approval		
	Total	Before topic approved	Less than 2.0 yrs.	2.0 thru 2.9 yrs.	3.0 yrs. or more
Biosciences	4.4	2.5	34.7	29.0	36.3
Botany	4.2	2.5	39.6	21.9	38.5
Microbiology	4.5	2.6	30.0	33.8	36.2
Zoology	4.6	2.5	36.1	29.5	34.4
Other Biosciences	4.6	2.5	32.9	31.6	35.5
Physical Sciences	4.3	2.7	28.9	30.9	40.2
Mathematics	4.4	3.2	17.4	28.1	54.5
Physics	4.7	3.0	16.5	34.8	48.7
Chemistry	4.3	2.6	32.6	31.6	35.8
Engineering	4.0	2.4	37.8	28.9	33.3
Social Sciences	3.8	2.8	20.1	39.7	40.2
Psychology	3.8	2.8	13.8	44.2	42.0
Sociology	3.8	2.6	28.1	35.4	36.5
Political Science	4.0	2.7	24.6	36.1	39.3
Economics	3.7	2.8	22.7	35.8	41.5
Humanities	3.9	2.5	32.0	38.0	30.0
History	3.8	2.3	38.0	36.6	25.4
F. Languages	4.3	2.6	23.2	45.1	31.7
English	3.9	2.6	30.9	34.0	35.1
All Fields	4.2	2.6	28.5	33.8	37.7

*Not necessarily continuous

physics graduates gained formal approval of a topic before completing 2.0 years in attendance.

(2) In eight of fifteen fields 30 per cent or more of the graduates reported *less* than 2.0 years in attendance prior to approval of the topic and, of these fields, six are characterized by shorter elapsed time to the doctorate (bioscience fields, chemistry and engineering).

(3) The fact that attendance patterns differ in terms of degree of continuity should be kept in mind. Thus, although the amount of time "in attendance" before approval of the topic does not vary markedly over fields, it should be noted that the *span of time*, following entry into graduate school, during which the total amount of attendance was *accumulated* does vary considerably. As we have seen, attendance in social sciences and humanities fields was often interrupted, particularly following receipt of the master's degree.

(4) Social science and humanities graduates (graduates in the longer elapsed time fields, generally) gained approval of the dissertation topic after having completed a somewhat higher proportion of their total time in attendance; or to put it another way, they spent less time in attendance *after* formal approval of the topic, a matter which will be considered in greater detail later.

(5) Formal approval of the dissertation problem occurred relatively late in the total program of graduate study for many individuals and it is evident that there was considerable variability among individuals in the time spent in attendance prior to the term during which the dissertation topic was formally approved. Generally speaking, delay in the initiation of dissertation research enhances the likelihood of "off-campus" completion.

PROGRESS TOWARD COMPLETION OF DISSERTATION REQUIREMENT

Respondents were asked to indicate progress made toward completion of the dissertation by the time formal residence and course requirements for the doctorate had been completed, in terms of the following alternatives: (a) dissertation had been completed, (b) basic research and/or analysis had been completed but some or all writing remained to be done, (c) all or essentially all basic data or source material had been collected but not completely analyzed, (d) had definite—and formally approved—plans for the dissertation and some basic data had been collected, (e) a dissertation proposal had been submitted but had not yet been formally approved, and (f) had not yet decided upon a dissertation topic. Their responses, summarized in Table 6.2 indicate substantial variability among individuals within each field in respect to the stage of progress attained.

(1) In the total sample, some 12.4 per cent reported that the dissertation had been completed but 13.6 per cent either had no topic or were awaiting formal approval of a proposed topic. Almost 36 per cent had collected some of the basic data or source material, some 16 per cent had collected essentially all basic data or source material, and about 20 per cent indicated that they had reached the "writing" phase.

(2) The bioscience graduates as a group tended to have made more progress toward completion of the dissertation at the selected point—some 64 per cent had advanced beyond the "data collection" stage when course and residence requirements had been completed; only about 4 per cent were without a formally approved topic. Social science graduates appear to have made least progress as a group, with only some 39 per cent beyond the "data collection" stage and roughly *29 per cent either without a topic or awaiting formal approval of a proposed topic.* Among physics graduates, also, a substantial proportion (some 31 per cent) had not yet reached the "data collection" stage.

(3) The major impression is one of substantial individual variability with respect to progress made on the dissertation by the time formal course and residence requirements had been met. Ignoring the marked individual variation, the modal category in all fields (except botany and microbiology) was "definite and formally approved plans for the dissertation, some basic data collected."

TIME SPENT ON THE DISSERTATION

Shown in Table 6.3 are data on the *time interval* between formal approval of the dissertation topic and submission of the dissertation in essentially final form in the several fields. These data are of particular interest and several trends merit some special comment. In evaluating these data it should be recognized that some individuals may have done a considerable amount of work related to the dissertation *prior to* time of "formal approval of the topic."

TABLE 6.2

Indicated Stage of Progress Toward Completion of Dissertation Requirement at Time Course and Residence Requirements Had Been Completed

(In per cent)

Field	Stage of progress: dissertation requirement						
	Completed	Writing phase	Analysis phase	Data collection	Topic proposed	No topic	No Response
Biosciences	(15.5)	(25.9)	(22.6)	(31.2)	(2.1)	(1.8)	(0.9)
Botany	16.8	24.8	32.7	22.8	1.0	1.0	1.0
Microbiology	17.6	38.8	11.8	25.9	1.2	4.7	0.0
Zoology	19.4	11.9	28.4	35.8	0.0	1.5	3.0
Other Biosciences	8.4	25.3	16.9	43.4	6.0	0.0	0.0
Physical Science	(11.3)	(19.7)	(16.2)	(38.2)	(5.5)	(6.0)	(3.2)
Mathematics	19.1	21.4	10.7	28.2	5.3	12.2	3.1
Physics	8.1	16.9	12.1	28.2	14.5	16.9	3.2
Chemistry	11.8	20.5	16.7	43.7	2.2	1.2	3.9
Engineering	6.3	18.3	22.3	39.4	6.9	5.1	1.7
Social Science	(12.0)	(13.2)	(13.4)	(29.9)	(12.7)	(16.7)	(2.2)
Psychology	16.0	14.4	13.9	19.6	16.0	18.6	1.5
Sociology	12.9	11.9	19.8	37.6	7.9	7.9	2.0
Political Science	6.1	13.6	9.1	36.4	9.1	22.7	3.0
Economics	3.5	10.5	5.3	43.9	14.0	19.3	3.5
Humanities	(13.0)	(24.8)	(10.3)	(42.0)	(3.9)	(4.5)	(1.5)
History	10.5	24.5	11.9	43.4	3.5	2.8	3.5
Foreign Languages	22.1	30.2	10.5	30.2	3.5	3.5	0.0
English	8.8	20.6	7.8	50.0	4.9	7.8	0.0
All Fields	12.4	20.2	15.7	35.8	6.2	7.4	2.3

TABLE 6.3

Time Interval Between Formal Approval of Dissertation Topic and Submission of Essentially Completed Dissertation, By Field

Field	N	Average time interval (yrs.)		Per cent in interval				
		Mean	Median	Less than 1.0 year	1.0 thru 1.9 yrs.	2.0 thru 2.9 yrs.	3.0 thru 3.9 yrs.	4.0 yrs. or more
Biosciences	329	2.2	2.1	11.2	32.2	36.5	12.5	7.6
Botany	99	2.1	2.1	7.1	40.4	39.4	9.1	4.0
Microbiology	82	2.0	2.1	12.2	30.5	41.5	12.2	3.6
Zoology	66	2.5	2.2	12.1	27.3	30.3	13.6	16.7
Other	82	2.2	2.1	14.6	28.0	32.9	15.8	8.5
Phys. Science	802	1.9	1.8	15.2	40.0	30.9	9.8	4.0
Mathematics	125	1.6	1.2	29.6	44.0	14.4	5.6	6.4
Physics	120	1.8	1.7	9.2	47.5	33.3	5.8	4.2
Chemistry	387	1.9	2.0	13.2	35.9	35.1	11.9	3.9
Engineering	170	1.9	1.8	13.5	41.2	31.8	11.2	2.4
Soc. Science	412	1.7	1.3	30.1	40.3	16.5	7.0	6.1
Psychology	194	1.1	1.0	46.9	41.2	8.2	3.6	0.0
Sociology	100	2.0	1.7	16.0	42.0	25.0	8.0	9.0
Pol. Sci.	64	2.1	1.6	20.3	40.6	18.8	9.4	10.9
Economics	54	2.4	2.2	7.4	33.3	27.8	14.8	16.7
Humanities	326	2.7	2.2	8.9	30.7	25.2	14.7	20.6
History	139	2.8	2.3	7.2	30.2	27.3	12.2	23.0
F. Lang.	86	2.6	2.1	11.6	30.2	27.9	12.8	17.4
English	101	2.6	2.2	8.9	31.7	19.8	19.8	19.8
All Fields	1869*	2.0	1.8	16.7	37.1	27.7	10.5	8.0

*Measures of central tendency and percentages reported in this table are based on the total number of cases for which adequate data were reported.

(1) For all bioscience fields and humanities fields, medians were slightly more than two years, ranging from 2.1 thru 2.3 years. The somewhat higher *mean* (2.7 years) for humanities graduates reflects a higher proportion of more "prolonged" dissertation programs in these fields; for some 35 per cent the time interval was 3.0 years or more and for one-fifth it was 4.0 years or more.

(2) Completion of the dissertation after formal approval of the topic was most rapid in psychology and mathematics; and, generally speaking, in the social sciences and physical sciences. It may be recalled that formal approval of the topic typically came after a relatively long period of graduate attendance among mathematics graduates; thus once the topic was selected, completion of the dissertation was not a prolonged affair in this field.

(3) Completion of the dissertation typically involved considerably more than one calendar year; some 46 per cent of all graduates reported an interval of 2.0 years or more, and only 17 per cent reported an interval of less than 12 months.

(4) In general, except for the relatively rapid completion time reported by psychology and mathematics graduates, the major source of variation *among fields* appears to be in the relative proportion of "more prolonged" dissertation programs; 30 per cent or more of the graduates in humanities generally, in economics, and in zoology reported an interval of 3.0 years or more as compared to some 18.5 per cent in the total sample. As indicated earlier, these trends are reflected in the fact that means in these fields are somewhat higher than medians. Average time taken to complete the dissertation is associated with median matriculation-to-doctorate time lapse (rho = .61).[1]

Of equal interest are data regarding the amount of time spent in residence and in employment, respectively, after formal approval of the topic.

---

[1] Berelson (1960, pp. 180-181) reports averages for "total time spent working directly on [the dissertation]" and length of dissertation in pages. Median years ("actual time") were as follows: physical sciences, 1.7; biological sciences, 1.6; social sciences, 1.1; humanities, 1.3. These figures are somewhat lower than the medians shown in Table 6.3 which reflect elapsed time from topic approval to completion of the dissertation rather than respondents' estimates of "actual" time spent working on the dissertation.

Median length of dissertation (as reported by Berelson) and median time between topic approval and completion for the fifteen fields shown in Table 6.3 are moderately related (rho = .65).

Residence vs. Employment after Approval of the Topic

We have already noted that fields may be differentiated in terms of the amount of time "in attendance" *after* formal approval of the topic. More detailed evidence regarding the distributions of years in residence and years in full-time employment during the "dissertation period" is provided in Table 6.4. In these data we see relatively clear distinctions among the fields.

(1) In the fields characterized by a longer predoctoral period (e.g., all humanities, all social sciences except psychology) relatively few individuals were in residence for as many as two years after formal approval of the dissertation topic (percentages ranging from 2.0 to 22.1) but many were *employed* for 2.0 years or more (from roughly 22 per cent in sociology to almost 39 per cent in economics). On the other hand, 37 per cent of bioscience graduates and 28 per cent of physical science graduates spent 2.0 years or more in residence after formal approval of the topic; only roughly 7 per cent of chemistry graduates were *employed* for two or more years.

(2) Again, consistent with previously noted trends in *ratings* given the "off campus" dissertation as a "lengthening influence," there is a relatively high degree of correspondence (rho = .84) between ranks of fields in terms of median entry-PHD time lapse and percentage of individuals reporting one or more years of full-time employment following formal approval of the dissertation topic.

CONTRIBUTION OF THE RESEARCH ASSISTANTSHIP

As noted previously, in terms of its contribution to completion of doctoral requirements, the research assistantship may have both a sustaining role, as a source of income, and a directly instrumental role, by contributing to completion of the dissertation requirement. About 43 per cent of all graduates reported that they held a research assistantship, with considerable variation among the broad areas. Over one-half of bioscience graduates but fewer than one-sixth of humanities graduates reported a research appointment. Did this work contribute to completion of the dissertation requirement? Was the contribution similar in all broad areas?

Answers to these questions are suggested in Table 6.5. In

TABLE 6.4

Comparison, By Field, of Years in Residence and Years in Full-time Employment During the Period between Formal Approval of Dissertation Topic and its Completion

	Years in residence* (Per cent reporting)			Years employed full-time* (Per cent reporting)		
Field	Less than 1.0 yr.	1.0 thru 1.9 yrs.	2.0 yrs. or more	Less than 1.0 yr.	1.0 thru 1.9 yrs.	2.0 yrs. or more
Biosciences	26.8	36.0	37.2	75.0	10.1	14.9
Botany	24.8	40.6	34.6	78.2	9.9	11.9
Microbiology	25.9	37.6	36.5	77.6	12.9	9.4
Zoology	32.8	32.8	34.3	67.1	9.0	23.9
Other	25.3	31.3	43.4	74.7	8.4	16.8
Physical Sciences	35.9	36.4	27.7	77.4	12.1	10.6
Mathematics	64.1	29.0	6.9	68.7	16.0	15.3
Physics	44.4	38.7	16.9	60.5	21.0	18.5
Chemistry	27.1	35.7	37.2	86.7	6.3	6.9
Engineering	29.7	41.7	28.6	73.7	16.6	9.7
Social Sciences	69.9	26.6	3.6	62.2	21.3	16.4
Psychology	79.4	19.6	1.0	74.2	20.6	5.2
Sociology	63.4	34.6	2.0	52.5	25.7	21.9
Pol. Sci.	60.6	33.3	6.1	65.2	12.1	22.6
Economics	59.6	28.1	12.3	35.1	26.3	38.7
Humanities	51.0	33.5	15.4	55.0	14.5	30.5
History	49.3	35.0	15.7	56.7	11.9	31.5
F. Lang.	40.7	37.2	22.1	59.3	14.0	26.7
English	63.7	28.4	7.8	49.0	18.6	32.4
All Fields	44.3	33.7	22.0	69.8	14.2	16.0

*Reported as "months" and converted to calendar year equivalent.

the natural sciences, where a greater proportion of graduates held research assistantships a substantial majority of responses indicated that work done was applied directly, or was related to the dissertation. In the humanities, at the opposite extreme, only 14 per cent of the small number of individuals who had held a research appointment, indicated that the work was directly applied to the dissertation; 65 per cent of the former research assistants said their work was *unrelated* to the dissertation. Moreover, 47 per cent of social science graduates who had held research appointments reported that the work done was unrelated to the dissertation.

In essence, for more than one-third of the natural science graduates, work which contributed to their financial support also contributed *directly* to completion of the dissertation requirement; for only two per cent in humanities and 16 per cent in the social sciences did this happy combination of circumstances obtain.

TABLE 6.5

Contribution to the Dissertation of Work Done as a Research Assistant, by Broad Areas

			Work done as a research assistant was		
Area	N	Per cent reporting assistantships*	Directly applied to dissertation	Related but not directly applied	Unrelated to dissertation
Bio. Sci.	(336)	54.2	32.6 (60.1)	8.6 (15.8)	13.0 (24.1)
Phy. Sci.	(844)	48.6	38.0 (78.3)	4.4 (9.0)	6.2 (12.7)
Soc. Sci.	(418)	44.0	15.7 (35.6)	7.6 (17.2)	20.7 (47.2)
Human.	(331)	15.4	2.1 (13.9)	3.2 (20.9)	10.1 (65.2)
All Fields	(1929)	42.9	26.6 (62.0)	5.5 (12.8)	10.8 (25.2)

---

*Entries in parentheses represent per cent of those reporting an assistantship, and others represent per cent of all graduates in the area. Thus, 32.6 per cent of all bioscience graduates (or 60.1 per cent of those holding assistantships) reported that work done as a research assistant was directly applied to the dissertation, etc.

SUMMARY

Formal approval of the dissertation topic occurred relatively late in the graduate study programs of many individuals. For over one-third of the sample, more than 3.0 years of attendance had been completed prior to the quarter or semester during which they gained formal approval of the dissertation topic. And, only about 28 per cent of the sample reached this stage of progress before completing the equivalent of 2.0 calendar years of graduate study (8 quarters or 5⅓ semesters).

Less than one-eighth of the group reported that they completed the dissertation prior to completing course and residence requirements for the doctorate; a slightly larger proportion indicated that they still had no formally approved topic at this time in their graduate careers. A major impression is one of marked individual variability in respect to progress made toward completion of the dissertation when formal course and residence requirements had been met. As a group, social scientists had made least progress while bioscience graduates tended to have made most progress toward completing the dissertation.

Completion of the dissertation itself, measured in elapsed time from date of formal approval of the topic, typically involved much more than one calendar year; almost half the graduates reported a time interval of more than 2.0 calendar years. Median completion time ranged from 1.0 years (psychology) to 2.3 years (history) with 13 of the 15 medians falling between 1.6 and 2.3 years around the sample median of 1.8 years.

There is a high degree of correspondence between ranks of fields in terms of median entry-PHD time lapse and the percentage of individuals in the respective fields who reported one or more years of full-time employment following formal approval of the dissertation topic (rho = .84). This is, of course, quite consistent with the graduates' assessment of the "off-campus dissertation" as a "lengthening influence."

In all the humanities fields and in all the social science fields except psychology, relatively few individuals were in residence for as many as two years following approval of the topic while a substantial proportion were employed for 2.0 years or more; the opposite tended to be true of graduates in the natural science fields.

In addition to the fact that they spent more time "on-campus" during the critical dissertation phase of the graduate program than did their confreres in the social sciences and the humanities, natural scientists also had the advantage of holding research assistantships in which work accomplished was directly applicable to the dissertation. For more than one-third of the natural science graduates, work which contributed to their financial support also contributed directly to completion of the dissertation requirement but this was true for only two per cent in humanities and 16 per cent in social sciences.

CHAPTER VII

The Foreign Language Requirement

The requirement that all candidates for the Ph.D. possess or acquire (but not necessarily use) a "reading knowledge" of one or two foreign languages has been the subject of more comment—serious, facetious, formal, and informal—than perhaps any other single aspect of doctoral preparation. Whether knowledge of foreign languages is viewed as a "scholarly ornament" or as an instrument of scholarship, however, "meeting the language requirement" is a hurdle which has caused many students in hot pursuit of a Ph.D. to break stride and lose valuable time.

In an earlier chapter, for example, we saw that almost three-fourths of the graduates believed their undergraduate preparation in foreign languages to have been less than adequate. Moreover, more than one-fourth of the graduates reported that inadequate undergraduate preparation in foreign languages actually increased time taken to attain the doctorate. This was particularly true in the social sciences and humanities, being cited, for example, by 61 per cent of economics majors and 46 per cent of history majors, while less than one-fourth of graduates in the natural sciences reported delay due to inadequacy of preparation in languages.

PATTERN OF DOCTORAL LANGUAGES

Respondents were asked to report languages presented in fulfillment of the doctoral requirement, whether or not they had studied the language(s) in high school and college, respectively, and whether they needed special preparation after beginning graduate study in order to meet proficiency requirements.

As indicated in Table 7.1, most graduates met proficiency requirements[1] in French (93.7 per cent) and/or German (88.9), with Spanish a distant third (11.9); only 1 per cent of the physical science graduates reported Spanish but almost 30 per cent of social science graduates did so. A handful of individuals, mainly in the natural sciences, reported Russian.

NEED FOR SPECIAL PREPARATION

Only 22 per cent of the graduates indicated that they needed *no* special preparation in *any* language after beginning graduate study (see Table 7.2). Of those qualifying in German, 61 per cent required special preparation, as did 52 per cent of qualifiers in French, 60 per cent of those in Spanish and 83 per cent of the small number qualifying in Russian. Over 70 per cent of English, history, economics, political science, psychology, and sociology majors qualifying in German required special preparation, whereas in most science fields fewer than 60 per cent did so.

Not unexpectedly, fields in which higher percentages of graduates indicated the need for special preparation in a foreign language tend to be those in which higher proportions of graduates reported "inadequate undergraduate preparation in foreign languages" as a "lengthening" influence. Excluding foreign languages, the degree of correspondence between the ranks of the remaining fourteen fields in terms of these two percentages is indicated by rho = .68.

INCIDENCE OF LANGUAGE STUDY IN COLLEGE

A major source of difficulty is revealed in Table 7.3 which shows the percentage of individuals who studied various languages as undergraduates. Most of the individuals (83.2 per cent) had studied at least one language. However, it can be inferred that most studied *only* one: 41 per cent studied French, 54 per cent German, etc. Moreover, the time devoted to the study of foreign languages was only two years, on the average.

The extent of the problem for individuals in certain fields

---

[1] Replies of foreign language majors were retained in these analyses.

TABLE 7.1

Languages Presented in Partial Fulfillment of Doctoral Requirements, by Field

Field	Per cent of graduates reporting language					
	French	German	Spanish	Russian	Classical	Other
Biosciences	91.7	95.5	9.8	1.2	0.3	1.8
Botany	87.1	95.0	8.9	2.0	1.0	..
Microbiology	100.0	98.8	1.2	..	..	..
Zoology	80.6	88.1	25.4	1.5	..	..
Other Biosciences	96.4	95.2	6.0	1.2	..	..
Physical Sciences	96.6	97.0	1.2	2.1	..	0.6
Mathematics	93.9	92.4	4.6	0.8	..	..
Physics	95.2	96.8	..	4.8	..	..
Chemistry	97.8	99.0	..	1.7	..	..
Engineering	96.6	96.0	2.3	2.3	..	..
Social Sciences	92.6	70.8	29.4	0.2	..	2.2
Psychology	90.2	73.7	29.4	..	..	..
Sociology	97.0	62.4	33.7	1.0	..	1.0
Political Science	93.9	80.3	16.7	..	..	..
Economics	91.2	64.9	36.8	..	..	..
Humanities	90.0	84.9	19.0	0.3	6.3	4.8
History	89.5	74.8	25.2	..	..	..
Foreign Languages	81.4	89.5	26.7	1.2	19.8	..
English	98.0	95.1	3.9	..	3.9	..
All Fields	93.7	88.9	11.9	0.1	1.1	1.9

TABLE 7.2

Percentage of Those Meeting Doctoral Proficiency Requirements In Designated Languages Who Required Special Preparation in These Languages, by Field

Field	No special preparation required	Number requiring special preparation as a per cent of number qualifying in the language specified				
		French	German	Spanish	Russian	Classical
Biosciences	20.2	56.0	59.1	59.4	*	*
Botany	18.8	48.9	69.8	*	*	*
Microbiology	18.8	60.0	50.0	*		
Zoology	22.4	57.4	57.6	64.7	*	
Other	21.7	58.8	57.0	*	*	
Physicial Sciences	24.6	49.8	55.6	70.0	77.8	
Mathematics	29.0	54.5	55.4	*	*	
Physics	24.2	56.8	57.5		*	
Chemistry	29.2	32.1	44.1		*	
Engineering	10.9	84.0	82.1	*	*	
Social Sciences	14.1	61.0	74.3	69.9	*	
Psychology	14.4	61.7	72.7	68.4		
Sociology	15.8	55.1	71.4	67.6	*	
Pol. Sci.	15.2	59.7	77.4	54.5		
Economics	8.8	71.2	81.1	85.7		
Humanities	26.9	40.6	66.9	41.3	*	57.1
History	22.4	48.4	72.9	55.6		
F. Lang.	45.3	12.9	49.4	17.4	*	52.9
English	17.6	50.0	74.2	*		*
All Fields	22.0	51.7	61.3	60.5	83.3	54.5

*Less than 10 cases reporting this language, percentages not computed.

may be pointed up by comparing the percentage studying a given language in college (Table 7.3) with the percentage qualifying in that language (Table 7.1). We see, for example, that only 37 per cent of English majors studied German during their undergraduate careers while 95 per cent qualified in German. A majority of natural science respondents studied German as undergraduates; fewer studied French. For social sciences and humanities, the opposite tended to be true (i.e., proportionately more studied French than German) but neither of these languages was studied by a majority of the doctoral graduates during their undergraduate careers.

Data (not tabled) on incidence of language study in high school indicate the relatively greater popularity at this level of classical languages (studied by 28 per cent at the high school, but by only 6 per cent at the undergraduate level). While 69 per cent of the group studied some language in high school, only 9 per cent reported that they studied German. French led in popularity at this level, being reported by 31 per cent of the entire group.

A BRIEF ANALYSIS

These data reflect a state of affairs which has long been decried, namely, that a record of sustained preparation in foreign languages during the high school-college period is the exception rather than the rule among graduate students. In view of the lack of extensive undergraduate (or earlier) preparation, it is understandable that "meeting the language requirement" should be a source of considerable frustration as well as delay for many graduate students. Moreover, in a situation in which the majority of doctoral graduates meet a doctoral proficiency requirement in one or two foreign languages without having studied one or both of those languages as an undergraduate, one might well question the level of proficiency attained through "special preparation" undertaken after beginning graduate study.[2]

Of considerable interest, also, is the variability among fields in respect to reported need for special preparation in foreign languages after beginning graduate school. Generally speaking,

---

[2] In a national sample of doctoral graduates, only one-fourth responded affirmatively to the question, "Do you feel you really know the language(s) in which you passed the necessary examinations?" (Berelson, 1960, p. 197).

TABLE 73

Incidence of Undergraduate Language Study By Doctorate Field

Field	Per cent studying language in college						Mean yrs. of lang. study*
	French	German	Spanish	Classical	Other	Any lang.	
Biosciences	38.1	61.3	**	2.7	1.2	83.0	1.7
Botany	30.7	43.6	**	2.0	2.0	69.3	1.6
Microbiology	41.2	62.4	**	2.4	1.2	95.3	1.6
Zoology	32.8	70.1	**	3.0	..	74.6	1.8
Other	48.2	74.7	**	3.6	1.2	94.0	1.9
Physical Sciences	30.4	64.6	8.9	2.1	1.8	78.3	1.7
Mathematics	37.4	45.8	19.8	5.3	3.1	80.9	1.8
Physics	30.6	66.1	8.9	3.2	2.4	85.5	1.6
Chemistry	34.8	82.4	6.8	1.4	1.0	87.7	1.8
Engineering	14.9	36.0	5.7	0.6	2.3	49.1	1.2
Social Sciences	43.8	36.6	26.8	6.9	1.0	86.6	1.8
Psychology	42.3	44.1	24.1	5.7	1.0	87.6	1.8
Sociology	44.6	28.0	28.0	6.9	1.0	90.1	1.7
Pol. Sci.	53.0	33.3	39.4	13.6	1.5	93.9	2.1
Economics	36.8	29.8	19.3	3.5	..	68.4	1.7
Humanities	68.0	44.1	32.3	19.6	7.6	91.5	3.2
History	65.7	40.6	27.3	14.0	2.1	90.2	2.4
F. Lang.	77.0	58.6	49.4	30.2	20.9	95.4	4.9
English	63.4	36.6	24.8	18.6	3.9	90.2	2.6
All Fields	41.1	54.5	18.6	6.3	2.7	83.2	2.0

*All languages combined.
**Data not available.

need for special preparation was mentioned relatively more frequently by graduates in the social sciences and humanities (excluding foreign languages) than by natural science graduates (except in engineering). And, as noted earlier, the percentage requiring special preparation tended to be associated over fields with the percentage citing inadequate language preparation as a "lengthening" factor.

Yet, judging from the data in Table 7.3, there are no marked differences among the fields in respect to the total amount of time devoted to undergraduate language study and there is nothing to suggest that the reason why natural scientists as compared, for example, to social scientists in the sample were less frequently delayed by the language requirement was that they were relatively more proficient (better prepared) in the languages involved. At the same time, evidence from other studies indicates (a) that there is substantial variability among the fields in the extent of professional use of foreign language skills and (b) that natural scientists tend to make more use professionally of foreign language references than their colleagues in the social sciences and a number of other disciplines.[3]

In partial explanation of findings of this kind, it is reasonable to hypothesize that a higher level of general proficiency in foreign languages may be necessary for *effective* professional use in some fields (e.g., history and psychology) than in others (e.g., chemistry or biology). In any event, the fact of departmental (disciplinary) differences in patterns of foreign language preparation and use is a significant one.

Whatever the ultimate explanation of such differences may be, it is evident that in connection with the foreign language requirement, as in connection with the research requirement, graduates in most natural science fields as compared to those in social science fields, and the humanities fields as well, tend to find circumstances more conducive to "rapid completion of requirements." More generally, the problem of making "the language requirement" a meaningful aspect of doctoral preparation, across the disciplinary board, will continue to be a formidable one.[4]

---

[3] Several studies provide relevant data here. For example, Berelson (1960, p. 198) cites percentages of reported use professionally (pre- or post-doctoral), by recent graduates, ranging from under 20 per cent (education, economics, and psychology) to 75 per cent or more (chemistry, zoology, mathematics and statistics, biology and religion). Weitz, Ballantyne, and Colver (1963) in an analysis of foreign language citations in dissertations at one university found similar variability by department. More than one half of the dissertations in psychology, economics, and history had *no* foreign language citations but in biochemistry, chemistry, and zoology, fewer than 15 per cent failed to include at least one such citation. See also, Keniston (1959, pp. 95-96).

---

[4] Berelson (1960) reports that a departmental, rather than a "graduate school as a whole" solution to this problem was acceptable to about half the graduate faculty surveyed in his recent study of graduate education.

CHAPTER VIII

Differences Among Institutions and Departments: Selected Indices of Duration

With respect to each of the measures of duration which have been examined, there is ample evidence of substantial variability among individuals within each field and in the averages for the respective fields. The analyses reported in the present chapter highlight differences among graduates of different institutions and departments in respect to selected indices of "time taken to attain the doctorate," namely, entry-PHD time lapse and age at time of degree conferral.

It should be recalled at the outset that about half the respondents attended more than one graduate school; 32 per cent attended only two, earning a master's degree at the first and the doctorate at the second, while 17 per cent attended two or more, with some non-degree work at one or more. Thus, for example, the degree-granting institution (department) may have been "responsible" for both the pre- and post-master's phase of an individual's graduate program or for only the post-master's portion of the program. In such circumstances, observed differences among the graduates of different institutions and/or of different departments within the same institution in respect to "duration" must be thought of as reflecting the total predoctoral experience of the individuals involved and not simply experience at the respective doctoral institutions.

These limiting factors notwithstanding, the analyses undertaken point up marked variability among graduates of different departments in a given field in time taken to attain the doctorate, and in age at time of degree conferral; also, considerable variation from department to department within a given institution in respect to graduates' rates of progress relative to norms for their respective fields.

TIME TAKEN TO ATTAIN THE DOCTORATE: DIFFERENCES BY DEPARTMENT

For purposes of analysis, the graduates of each department were classified according to entry-PHD time lapse[1] into two groups, namely a "faster" group (time lapse *less than* the median for the field in question) and a "slower" group (time lapse *greater than* the field median). For each of 111 departments, the

TABLE 8.1

Distribution of 111 Departments According to Percentage of Graduates with Entry-PHD Time Lapse Below Field Medians

Percentage of "faster" graduates*	Biological science departments	Physical science departments	Social science departments	Humanities departments	All departments
90+	1	1			2
80-89	1	1			2
70-79	1	2	2	3	8
60-69	5	7	4	1	17
50-59	5	10	9	4	28
40-49	4	9	2	5	20
30-39	4	4	4	3	15
20-29	3	5	1	3	12
10-19		1	3		4
< 10	2	1			3
No. depts.	26	41	25	19	111

*Those with entry-Ph.D. time lapse less than the median for their respective fields.

---

[1] It should be remembered that this measure represents the interval from time of initial graduate enrollment, any institution, not necessarily from time of first enrollment at the doctoral institution.

percentage of "faster" graduates was then determined. Distributions of the percentages for the 111 departments, classified according to broader academic areas, are shown in Table 8.1.

Percentages of "faster" graduates ranged from zero to 100—in four departments more than 80 per cent of the graduates were "faster" than average for their respective fields whereas in seven others, fewer than 20 per cent were "faster."

As revealed in Table 8.2, similar differences in rate of progress toward the doctorate, relative to appropriate field norms, obtained among areas within the same institution and, in general, among the institutions. In the biological science fields, for example, about 60 per cent of the graduates of Institutions K and M were "faster" than average as contrasted with 18 per cent of those at Institution L. As for internal variability we see that in Institution E, for example, 87 per cent of physical science but less than 40 per cent of social science graduates were "faster" than average for their respective fields; at Institution M, on the other hand, less than one-fourth of physical science graduates but two-thirds of social science graduates were "faster."

MEDIAN AGE OF GRADUATES: DEPARTMENTAL VARIATION

Also of interest is the extent of variability among departments in age of graduates at time of degree conferral, as revealed in Table 8.3.

Departmental medians, all fields, ranged from 27 years to 42 years, a range reflecting differences among the respective fields as well as differences among the departments within a given field. The mean of 113 departmental medians (departments with five or more graduates only) was 31.9 years, which compares with a mean age of 31.5 years for all individuals in the sample. Of considerable interest is the fact that the standard deviation of the medians for 113 departments ($\sigma = 3.3$) is approximately 55 per cent as great as the standard deviation of the age distribution for all individuals ($\sigma = 5.6$).

Distributions of age medians for departments in 15 fields classified according to median BA-PHD time lapse, and the distributions of medians for departments in the fields of chemistry and history, respectively, further point up differences among the fields and among departments. To note extreme cases, for exam-

TABLE 8.2

Percentage of Graduates Earning Ph.D. in Less Than Average Elapsed Time (Entry-PHD), By Institution and Broad Areas

Institution	Per cent with entry-PHD time lapse below field medians				
	Bio-sciences	Physical sciences	Social sciences	Humanities	Total
A	**	61			62
B		67		**	60
C	58	57	55	60	57
D	44	68	56	50	57
E	50	87	39	57	55
F	**	48	70		55
G	**	47		**	54
H	28	57	50	64	54
I	**	52			53
J		53			53
K	62	54	36	38	52
L	18	**	56	48	49
M	60	22	67	**	48
N	**	48			47
O	**	42	56		46
P	**	58	36	40	46
Q	**	40	52	37	45
R	31	47	**	25	41
S	**	32	31	**	40
T	**	**	**	40	38
U		**	**	61	35
V	46	26			32
All Individuals	50	50	50	50	50

**Indicates less than 10 cases—percentages not reported but cases included in calculation of the "all fields" percentage for an institution.

TABLE 8.3

Variation among Departments in Age of Graduates at Time of Degree Conferral: Distribution of Medians for 113 Departments

Median age in yrs.	Chemistry only	History only	Groups of fields by median BA-PHD time lapse			All fields
			6-7 yrs.[a]	8-9 yrs.[b]	10 yrs. plus[c]	
42		1			1	1
41		1				1
40		1			2	2
39						
38		1			2	2
37				1	1	1
36			3	3	5	11
35				1	1	2
34		2		3	6	9
33			2	4	3	9
32	1	1	7	9	4	20
31		2	2	7	2	11
30	1	1	11	4	2	17
29	7		9	2		11
28	5		10	4		14
27	1		2			2
No. of dpts.	15	10	46	38	29	113
$\overline{X}_{\text{mdns.}}$	28.8	35.1	30.1	31.8	34.7	31.9
$SD_{\text{mdns.}}$	1.1	4.3	2.2	2.3	3.2	3.1

[a] chemistry, engineering, microbiology, psychology, and other biosciences.

[b] botany, mathematics, physics, sociology, and zoology.

[c] history, foreign languages, English, political science, and economics.

ple, it may be observed that for 13 of 15 chemistry departments, but for *none* of the 10 history departments, *median* age of graduates was under 30 years. Chemistry departments were much less variable, in both relative and absolute terms, than history departments in respect to median age of graduates. In relative terms, the standard deviation for chemistry medians is about 4 per cent as great as the mean, while that for history medians is about 12 per cent as great; also, relative to the standard deviation for all individuals in the respective fields, that for departmental medians in history ($\sigma = 4.3$) is about two-thirds as great as that for all *individuals* in history ($\sigma = 6.5$) while variability for chemistry medians ($\sigma = 1.1$) was only about one-fourth that for all chemistry graduates ($\sigma = 4.2$).

Similar trends may be observed in the distributions of departmental medians for the three groups of fields, differing in median BA-PHD time lapse.

Concomitants of Departmental Differences in Duration

For a variety of reasons, analysis designed to identify the concomitants of inter-institutional (departmental) variation in average elapsed time of graduates was not pursued intensively. Departments in three fields (chemistry, mathematics and history), selected rather arbitrarily were classified according to per cent of "faster" graduates i.e., those with entry-PHD time lapse below field medians). Several variables were examined (e.g., ratings of factors as "lengthening" influences, ratings of importance for various sources of financial support) but few pronounced concomitants of departmental variation were identified.

Selected relationships are shown in Table 8.4. In chemistry, for example, the total and average amount of fellowship support increased as average duration decreased over departments but this relationship did not obtain for either mathematics or history.

Except in the field of history where very few graduates failed to take a master's degree, departments with "faster" graduates, as compared to those with "slower" ones, typically permitted more individuals to by-pass the master's and, in all three fields, incidence of interrupted study following the master's degree was associated with duration.

TABLE 8.4

Amount of Fellowship Assistance, Incidence of Delay Following the Master's Degree and Percentage of Graduates Without the Master's Degree in Relation to Departmental Variation in Duration

Per cent "faster" graduates*	No. of departments	No. of individuals	Reporting fellowships (%)	Average amount in $00's	Per cent interrupting following master's	Per cent not taking master's
Chemistry						
60 plus	(2)	67	67.2	28.5	10.5	29.9
40-59	(10)	305	48.6	25.5	20.3	21.6
< 40	(3)	41	29.2	23.6	31.7	0.0
Mathematics						
60 plus	(1)	14	7.7	..	0.0	21.4
40-59	(5)	95	25.3	28.8	33.7	16.8
< 40	(4)	22	8.8	27.3	45.5	0.0
History						
60 plus	(2)	41	63.4	15.8	36.6	4.9
40-59	(3)	51	43.1	19.5	45.1	0.0
< 40	(2)	30	56.7	14.8	56.7	6.7

*Per cent of departments' graduates characterized by entry-to-doctorate time-lapse which was less than average for the field. Thus, the entries for chemistry indicate two departments in which 60 per cent or more of graduates were characterized by less than average elapsed time, involving a total of 67 individuals, 67.2 per cent of whom reported fellowship, etc.

SUMMARY

The analyses reported in this chapter reveal substantial differences among the graduates of different doctoral departments in a given field in overall rate of progress toward the doctorate relative to field norms and in age at time of degree conferral. Moreover, evidence has been adduced to support the proposition that substantial variability obtains among the various doctoral programs within a given institution in relative rate of progress of graduates.[2]

---

[2] This points up the decentralized nature of graduate study in which the actual locus of work is with a graduate department (Heard, 1963).

The study was not designed to examine directly the relationship of departmental practices and procedures to the observed differences in the average age and elapsed time figures for graduates and the analyses undertaken were limited in scope.

In three fields selected for study, average rates of progress tended to be higher in departments in which a higher proportion of graduates by-passed the master's degree and in which smaller proportions interrupted study following receipt of the master's degree. In one field (chemistry) amount and incidence of fellowship support was associated with departmental rates of progress but this was not the case for the fields of mathematics and history.

While few firm conclusions can be drawn regarding the correlates of departmental differences, it can be inferred that differences in average age of graduates reflect substantial differences in the nature, scope, objectives and outcomes of the departmental programs. It is probable, for example, that a history department in which the typical graduate is 40 years of age at the time of degree conferral will be "different" in a variety of significant ways from one in which the typical graduate is 30 years of age. And, it is obvious that the career patterns of the graduates of such departments have been and are likely to continue to be quite different.

Of considerable interest is the evidence that variability among departments in age of graduates is more than one half that for all individuals but that this ratio tends to be smaller for certain fields than for others. In general, the ratio of variability among departments to variability among individuals tends to be greater for fields characterized by longer elapsed time than for fields with shorter elapsed time. Chemistry departments, for example, were relatively homogeneous with respect to median age of graduates while history departments were extremely heterogeneous in this regard. This is consistent, of course, with the assumption that chemistry is a more "structured" discipline than history.

The wide range of departmental differences in average age of graduates and in average entry-PHD time lapse suggests that study of the concomitants of such differences is necessary to full understanding of the duration problem.

CHAPTER IX

Contrasts Between Faster and Slower Groups

In view of the many personal and situational factors which may affect the timing of entry into graduate study and/or rate of progress toward the doctorate thereafter, it is not surprising that marked individual variability should obtain, within every field, in respect to both BA-PHD and entry-PHD time lapse (and other indices of duration as well). The analyses reported in this chapter were designed to point up factors associated with individual differences in BA-PHD time lapse by contrasting "faster" and "slower" groups within the various fields.

In conducting the analyses, individuals within each field were first sorted into two groups defined in terms of BA-PHD time lapse, namely, a "faster" group (characterized by BA-PHD time lapse less than the field median) and a "slower" group (characterized by time lapse greater than the field median). Thus, half the individuals in each field, and in the total sample, were in the faster group and half were in the slower group.[1] It should be noted that the definition of criterion groups is in terms of rate of progress *relative to appropriate field norms.*

It was expected, a priori, that faster and slower groups would be differentiated significantly by a number of variables pertaining to (a) predoctoral employment, (b) graduate attendance, (c) continuity of program, (d) development of graduate study goals and disciplinary interests, (e) patterns of financial support, (f) the preliminary examination and the dissertation, (g) the foreign language requirement, (h) post-doctoral employment, and (i) family status.

---

[1] If "faster" and "slower" groups had been defined in terms of entry-PHD rather than BA-PHD time lapse, 80 per cent of the classifications would have remained unchanged.

Analyses were based on all cases for which basic data were available. BA-PHD time lapse indices were available for 1865 individuals, or 96.7 per cent of the sample, distributed as follows by major areas: biosciences, 325; physical sciences, 815; social sciences, 403; humanities, 322.

Generally speaking, this expectation proved to be realistic for the data under consideration.[2] Results of the basic analyses undertaken in the areas outlined above are reported in the sections which follow. Trends revealed in the data for faster and slower groups in each of the major academic areas were also present in data for faster and slower groups in the respective fields, in most instances.

PREDOCTORAL EMPLOYMENT

Substantial percentages of both the faster and slower groups had some full-time predoctoral employment (exclusive of graduate appointments), as shown in Table 9.1. It is apparent, however, that splitting the sample at the respective field medians in terms of BA-PHD time lapse resulted in the identification of two groups differing greatly in both incidence and average years of predoctoral employment. Actually over 94 per cent of the slower group reported predoctoral employment and about 62 per cent of the faster group did so, but differences in mean years of predoctoral employment were more striking—8 years for the slower group as compared to only 2 years for the faster group.

GRADUATE ATTENDANCE

It will be recalled from Chapter II that *fields* of greater duration (elapsed time) tended to be those in which graduates reported fewer years of graduate attendance on the average. It is quite apparent, however, that within the respective fields, faster graduates spent fewer years in attendance than slower ones. Without regard to field, almost two-thirds of the slower group reported at least 4.0 years of attendance whereas less than half (46 per cent) of the faster group did so. Total attendance was least differentiating for faster and slower bioscience graduates.

---

[2] It should be recognized that in an ex post facto comparison of "faster" and "slower" individuals, particularly one in which there are no means of adjusting for individual differences in general academic competence, motivation and other theoretically relevant traits, the interpretation of observed differences is necessarily clouded by a certain degree of ambiguity.

TABLE 9.1

Incidence and Mean Years of Predoctoral Employment (All Types—Excluding Graduate Assistantships) For Faster and Slower Groups, by Field*

Field	Faster Group		Slower Group		Total	
	Per cent employed	Mean (yrs.)*	Per cent employed	Mean (yrs.)	Per cent employed	Mean (yrs.)
Biosciences	51.9	1.4	93.9	6.9	73.5	4.1
Botany	42.6	0.9	95.9	7.4	69.3	4.2
Microbiology	61.2	1.2	95.0	6.5	74.1	3.7
Zoology	61.8	1.9	93.9	7.9	77.6	5.1
Other	52.5	1.5	90.5	5.7	74.7	3.8
Phys. Sci.	52.0	1.8	92.6	6.4	72.4	4.2
Mathematics	74.6	2.7	98.3	10.8	84.7	6.6
Physics	65.6	2.1	98.4	8.0	82.3	5.1
Chemistry	34.4	0.9	90.5	5.2	63.3	3.1
Engineering	66.3	3.2	89.4	5.1	77.7	4.4
Social Sciences	73.8	2.4	95.5	8.0	84.7	5.5
Psychology	70.1	1.7	93.6	5.8	82.0	3.9
Sociology	72.9	2.7	95.7	10.8	84.2	7.2
Pol. Sci.	78.8	3.1	100.0	9.4	89.4	6.0
Economics	72.1	3.4	96.3	10.9	89.5	7.0
Humanities	81.5	3.8	98.1	12.7	90.6	8.4
History	77.8	3.0	98.5	12.6	88.8	8.2
F. Lang.	77.5	3.8	95.1	11.4	88.4	7.5
English	90.0	4.9	100.0	14.3	95.1	9.4
Total	61.8	2.2	94.4	7.9	78.4	5.2

*Mean values reported are based on *all graduates* in the respective categories, not graduates reporting employment only (military service and non-professional employment included).

Also shown in Table 9.2 are data on part-time attendance; in all areas, proportionately more of the slower group reported one or more years of part-time attendance.[3] For example, roughly one-fifth of "faster" science graduates reported one or more years part-time whereas two-fifths of the "slower" group did so.

Proportionately, more natural science graduates than graduates in other fields reported one or more years part-time.

CONTINUITY OF STUDY

As expected, faster and slower groups were differentiated sharply by the degree of temporal continuity reflected in their patterns of study. As shown in Table 9.3, 84 per cent of the faster group entered graduate study within six months after receiving the bachelor's degree but only 48 per cent of the slower group did so. Degree of continuity of attendance after graduate matriculation differentiated the two groups to about the same degree—80 per cent of the faster but only 46 per cent of the slower group reported essentially continuous attendance from first enrollment in graduate school through completion of course and residence requirements for the doctorate.

Continuity and the Master's Degree

Individuals who did not take a master's degree made somewhat more rapid progress toward the doctorate. Some 16 per cent of the faster group but only 11 per cent of the slower group bypassed the master's degree which, among other things, provides a convenient "way station" en route to a higher degree. In analyses not tabled here, it was found that, considering only individuals with a master's degree, 52 per cent of the slower group "interrupted" following receipt of the master's but only 17 per cent of the faster group did so. Interruptions at this stage of educational development were much less characteristic of faster than of slower groups in all fields but most strikingly so in the physical sciences where less than 6 per cent of the faster group interrupted following the master's degree, while 49 per cent of the slower group did so.

---

[3] Respondents were given the following instructions regarding the matter of "full-time" versus "part-time" attendance: "In differentiating 'full-time' and 'part-time' attendance, consider a quarter, semester, or summer session as 'full-time' if during the term your graduate program constituted your *primary* responsibility."

TABLE 9.2

Years of Graduate Attendance, Total and Part-time, for Groups Differing in B.A.-PH.D. Time lapse

Group*	Calendar years in attendance (total)		Calendar years in attendance (part-time)**	
	Less than 4.0 years	4.0 years or more	Less than 1.0 year	1.0 years or more
Biosciences	(34.2)	(65.8)	(69.1)	(30.9)
Faster group	36.3	63.7	80.8	19.2
Slower group	32.3	67.7	57.9	42.1
Physical Sciences	(38.7)	(61.3)	(66.7)	(33.3)
Faster group	50.4	49.6	78.3	21.7
Slower group	27.0	73.0	55.2	44.8
Social Sciences	(56.2)	(43.8)	(75.2)	(24.8)
Faster group	68.5	31.5	77.7	22.3
Slower group	43.7	56.3	72.7	27.3
Humanities	(52.8)	(47.2)	(71.1)	(28.9)
Faster group	63.1	36.9	75.3	24.7
Slower group	42.4	57.6	66.9	33.1
Total	(44.2)	(55.8)	(69.7)	(30.3)
Faster group	54.1	45.9	78.1	21.9
Slower group	34.2	65.8	61.4	38.6

---

*Faster group characterized by BA-PHD time lapse *less than field medians;* slower group by time-lapse *greater than* respective field medians.

**Part-time defined as a period of attendance during which graduate program *was not the primary responsibility* of the respondent.

TABLE 9.3

Incidence of Direct Entry Into Graduate Study and Continuity of Graduate Attendance for Faster and Slower Groups, by Field

Field	Faster Group (Per cent)		Slower Group (Per cent)	
	Direct entry into graduate study*	Continuous attendance**	Direct entry into graduate study	Continuous attendance
Biosciences	85.9	89.6	48.5	50.9
Botany	83.0	93.6	42.9	49.0
Microbiology	90.2	87.8	52.5	47.5
Zoology	88.6	85.7	56.3	53.1
Other	82.5	90.0	45.2	54.8
Physical Sciences	87.3	91.9	48.3	49.5
Mathematics	85.7	81.0	46.7	30.0
Physics	88.5	86.9	57.4	42.6
Chemistry	91.4	96.0	51.5	54.0
Engineering	77.9	94.2	36.3	56.0
Social Sciences	84.8	69.1	50.0	50.0
Psychology	89.7	79.4	55.9	63.4
Sociology	80.4	67.4	46.8	38.3
Pol. Sci.	75.8	54.5	41.9	35.5
Economics	85.7	53.6	44.4	40.7
Humanities	72.2	56.2	46.9	26.9
History	73.6	58.3	48.6	31.4
F. Lang.	80.0	60.0	56.1	29.3
English	64.0	50.0	36.7	18.4
All Graduates	83.9	80.4	48.4	46.0

*Entered graduate school within six months after receiving bachelor's degree.

**No interruption of greater than six months' duration prior to completion of course and residence requirements for the doctorate.

Institutional continuity

Educational considerations aside, the programs of individuals who earn their bachelor's and doctor's degrees at the same institution should tend to have a somewhat greater degree of continuity, and, for this and other reasons (contacts, familiarity with professors, etc.) such individuals might be expected to exhibit lower elapsed time than those who move to new institutions. Whatever the explanation might be, while 18 per cent of the entire sample earned bachelor's and doctor's degrees at the same institution, 21 per cent of the faster group but only 15 per cent of the slower group did so. This trend, however, was essentially characteristic of the natural science fields; for biosciences, 24 per cent of the faster but only 10 per cent of the slower individuals had this pattern and for physical science fields, comparable percentages were 28 and 18, respectively. In social sciences and humanities the faster and slower groups were basically undifferentiated in respect to this pattern of attendance.

Continuity of Field

It is logical that rate of progress toward the doctorate should be more rapid among individuals for whom the undergraduate and Ph.D. fields are the same than among those with different graduate and undergraduate majors. That such was true of the present sample is indicated in Table 9.4 which shows that in all academic areas faster groups more frequently continued in the same major field; in the total sample, 70 per cent of the faster group, but only 59 per cent of the slower, reported no change of major fields. In the social science fields, particularly, continuity of field of study was associated with lower BA-PHD time lapse.

GRADUATE STUDY GOALS AND DEVELOPMENT OF DISCIPLINARY INTERESTS

Other things being equal, early development of disciplinary interests and of relevant graduate study goals should be conducive to greater continuity of progress toward the doctorate, temporarily and programmatically, and in turn to more rapid progress.

It is apparent in Tables 9.4 and 9.5 that timing of development of disciplinary interests and of relevant graduate study goals is associated with BA-PHD time lapse. The faster groups in all fields, as compared to the slower groups, were characterized by (a) earlier establishment of interest in the field which became the doctoral major, (b) earlier decision to pursue graduate study, and (c) earlier orientation toward "pursuit of the doctorate."

TABLE 9.4

Timing of Development of Interest in Ph.D. Field and Articulation of A.B. and Ph.D. Major for Faster and Slower Groups by Academic Areas

Group	First interested in field of Ph.D.			B.A. and Ph.D. field of major*	
	Before Jr. yr.	During Jr.-Sr. yrs.	After graduation	Same	Different
Biosciences					
Faster group	46.8	32.9	20.3	52.2	47.8
Slower group	40.2	22.0	37.8	42.7	57.3
Physical Sciences					
Faster group	72.4	17.0	10.6	78.2	21.8
Slower group	63.1	15.8	21.1	70.4	29.6
Social Sciences					
Faster group	44.1	37.2	18.6	65.5	34.5
Slower group	35.4	27.7	36.9	45.4	54.6
Humanities					
Faster group	59.5	19.6	20.9	71.6	28.4
Slower group	53.3	20.1	26.6	62.5	37.5
All Fields					
Faster group	59.6	24.6	15.8	69.8	30.2
Slower group	51.4	20.2	28.4	58.8	41.2

*Determination of "same" and "different" based on respondents' designations in this regard, not on direct comparison of listed majors at the two levels.

In the physical sciences (Table 9.4), a high proportion of both faster and slower individuals became interested in the Ph.D. field before the junior year of undergraduate work and also continued in the same field through the doctorate.

It is noteworthy that for 28 per cent of all slower graduates interest in the Ph.D. *field* did not develop until after college graduation; this was true for 37 per cent of the slower social science graduates and 38 per cent of the slower bioscience graduates.

TABLE 9.5

Timing of Development of Graduate Study Goals For Faster and Slower Groups, By Major Areas

	Graduate study became a definite personal goal			Earning a Ph.D. became a definite personal goal		
Group	Before sr. yr.	During sr. yr.	After sr. yr.	Before bachelor's degree	Before end of 1st grad. year	After 1st grad. year
Biosciences						
Faster group	46.2	37.0	16.7	25.8	61.0	13.2
Slower group	33.7	28.2	38.0	24.2	41.4	34.4
Physical Sciences						
Faster group	51.5	36.4	12.1	43.7	45.4	10.8
Slower group	30.6	31.6	37.8	19.1	46.1	34.8
Social Sciences						
Faster group	44.8	39.9	15.3	41.5	42.0	16.5
Slower group	35.2	30.6	34.2	19.5	45.1	35.4
Humanities						
Faster group	42.8	34.6	22.6	33.1	51.0	15.9
Slower group	26.4	31.0	42.6	19.3	43.5	37.2
All Fields						
Faster group	47.6	37.0	15.4	38.4	48.3	13.3
Slower group	31.4	30.7	37.9	20.1	44.6	35.3

Graduate study goals

Timing of development of graduate study goals (Table 9.5) differentiated faster and slower groups even more sharply than timing of development of disciplinary interests. For 38 per cent of the slower graduates (15 per cent of the faster) commitment to graduate study as a personal goal did not occur until *after college graduation;* in humanities this was true for 43 per cent of slower graduates and 23 per cent of the faster graduates.

In all fields, almost nine-tenths of the faster but less than two-thirds of the slower group became doctorate oriented before the first year of graduate study had been completed; only 13 per cent of the faster group but more than one-third of the slower did not become doctorate oriented until after the end of the first year of graduate study.

The fact that only 38 per cent of the *faster* group were committed to work toward a Ph.D. prior to college graduation points up a phenomenon already alluded to, namely, the relatively late emergence of "working toward a Ph.D." as a personal goal.

PATTERNS OF FINANCIAL SUPPORT

During both the beginning (master's) and advanced (doctoral) phases of graduate study, the following sources were more important for the faster than the slower group:

(1) research assistantships
(2) fellowships
(3) earnings of spouse
(4) miscellaneous graduate appointments
(5) teaching assistantships
(6) direct assistance from family.

At both levels, the following sources were more important for the slower than for the faster group:

(1) personal savings
(2) employment not related to the graduate program.

Veterans' benefits were much more important for the slower group than for the faster group during the advanced period of study while during the master's phase of study the picture was reversed (though the two groups did not differ nearly so greatly in terms of dependence on this source at the master's as at the doctor's level of study). This finding may be due, in part, to interruptions related to the Korean conflict or to the possibility that availability of financial assistance through the "G.I. Bill" attracted a substantial number of individuals who had thought of the master's degree as terminal back into graduate school to seek a Ph.D.—individuals likely to be in the slower group in terms of BA-PHD time lapse.[4]

The relative importance of these sources for faster and slower groups in the four broad academic areas and in the total sample during the doctoral phase of study is shown in Table 9.6.[5]

Of particular interest is the considerably greater importance of research assistantships and fellowships in the faster groups (except in social sciences, in which fellowships were more frequently of major importance in the slower group). Only in the humanities where they constituted the most generally available source of support did teaching assistantships substantially differentiate the faster and slower groups, being more frequently of *major* importance in the faster group.[6]

The general picture is one of a broader base of financial support for "faster" individuals. This, of course, may reflect differences in the overall capability of the two groups or the influence of other factors with respect to which "slower" and "faster" groups may differ in such a way as to affect patterns of financial

---

[4] In this general context, increases in BA-PHD time lapse averages in certain fields nationally during the past decade have been reported by the National Research Council (NAS-NRC, 1963), "in spite of the massive growth of Federal fellowship programs which are designed to decrease time lapse, and which in fact do result in significant acceleration for those obtaining awards . . . ." (p. 41). This anomalous "outcome" may be explained in part by the hypothesis that increased demand for doctoral graduates coupled with massive recruitment and support programs has attracted back into graduate school many "irregular" candidates, with longer BA-PHD periods, and made it possible for them to complete their degree programs—e.g., ABD's, erstwhile "noncandidates" who left graduate school with a master's degree, individuals who had been out of school for some time waiting for an opportunity to begin or return to a program of graduate study, etc.

[5] Trends reflected in the analysis of differences between faster and slower groups by broad academic areas appeared in most of the individual fields. For example, in 14 of the 15 fields research assistantships were more important for faster than for slower graduates; in 12 fields this was true for earnings of spouse; in 11 fields for teaching assistantships, etc.

[6] When ratings of "moderate" and "slight" importance are added to these, we find that differences between faster and slower groups are reduced. For example, 63 per cent of faster humanities graduates and 60 per cent of slower graduates reported teaching assistantships to be of some importance as sources of support. In the biosciences, moreover, 51 per cent of the slower as compared to only 47 per cent of the faster group reported teaching assistantships to be of some importance, reversing the trend for ratings of *major* importance only.

TABLE 9.6

Relative Importance of Various Sources of Financial Support for Faster and Slower Groups: Doctoral Phase of Program

Source	Per cent rating source of major importance									
	Bio-sciences		Physical sciences		Social sciences		Humanities		All Fields	
	F*	S**	F	S	F	S	F	S	F	S
Research assisttantships	43	22	36	25	26	14	10	3	31	18
Fellowships	18	15	29	14	11	14	21	10	22	14
Earnings of spouse	23	17	21	13	24	20	25	16	23	16
Miscellaneous graduate appointments	3	2	5	5	21	13	6	1	8	5
Teaching assistantships	30	29	27	27	20	19	41	30	29	26
Family support	2	4	5	2	4	2	9	6	5	3
Employment unrelated to program	4	16	7	17	7	9	5	11	6	14
Personal savings	5	21	4	9	7	15	12	19	6	15
Veterans' benefits	17	31	13	24	24	42	28	34	19	31

*Faster group

**Slower group

support.[7] In any event, faster individuals appear to have profited more frequently from support of a type conducive to greater time, economy (e.g., more fellowships and more research assistantships) as well as a broader base of support.

The foregoing inference from ratings of importance is borne out by additional data. For example, some 38 per cent of the faster group held two or more different types of graduate appointments while only 25 per cent of the slower group did so, with trends being similar within the majority of specific fields.

Research versus other types of appointments

We have already established the fact that recent recipients of the doctorate tended to perceive "teaching assistantships" as having had a "lengthening influence" in respect to time taken to attain a doctorate but that this was not true for "research assistantships." In Table 9.7, we see clearly that faster individuals more frequently reported a research assistantship than did slower individuals; almost half (49.1 per cent) of the faster group but only slightly more than one-third (35.8 per cent) of the slower group held such assistantships. In three of the four major areas, holding a non-research appointment was more characteristic of the slower than the faster group, as was holding no graduate appointment of any kind.

---

[7] It is probable both that an individual's "ability" or "aptitude" affects the likelihood of his obtaining an assistantship or a fellowship and that the availability of such support facilitates progress toward the degree. In an analysis of factors associated with stipend-holding among arts and sciences graduate students, for example, Davis (1962, pp. 58 ff.) found that advanced graduate students with assistantships and fellowships tended to receive higher faculty ratings for "native ability—required to complete a Ph.D. [in the student's department]" than those without such sources of support. As Davis notes, this result is not unexpected since "ability" is presumably a factor to be considered in making an award and since faculty members may include stipend-holding in judging ability.

As for the presumed facilitating effect of certain types of awards, Creager (1961) studied graduate fellowship applicants in terms of Ph.D. attainment rate and obtained estimates of "the magnitude of the residual relation between receipt of the [graduate fellowship award] and Ph.D. attainment rate after effects of aptitude, achievement, and level [stage of progress toward the Ph.D. at time the award was received] are removed." Estimated correlations (considered as point-biserial, awardees versus non-awardees) ranged from .08 in mathematics to .31 in geology and engineering, with all but one of the five estimated residual correlations being less than .18. Thus, award status was associated with more expeditious completion of programs, but there was marked overlapping between awardees and non-awardees in terms of Ph.D. attainment rate after controlling appropriate ability and training variables.

See also Harmon (1959) for additional evidence bearing on this general question.

TABLE 9.7

Graduate Appointment Patterns (Major Type) For Faster and Slower Groups, by Major Areas

Group	Held research appointment* (per cent)	Held appointment, but not research (per cent)	Held no graduate appointment (per cent)
Faster group	49.1	40.7	10.3
Biosciences	54.6	38.0	7.4
Physical sciences	57.9	33.4	8.7
Social sciences	50.5	39.7	9.8
Humanities	19.8	62.9	17.3
Slower group	35.8	46.0	18.2
Biosciences	47.2	36.2	16.6
Physical sciences	40.3	44.5	15.3
Social sciences	36.9	40.4	22.7
Humanities	11.2	66.9	21.9
Total	42.5	43.4	14.2

*May also have held other types of appointments, including teaching appointments.

A slightly different type of analysis, shown in Table 9.8, yielded results consistent with those just reported. One or more years in a research assistantship was more characteristic of faster than slower groups in all areas. However, "one or more years in a teaching assistantship" was more characteristic of the slower group in natural sciences and more characteristic of the faster group in social sciences and humanities.

PRELIMINARY EXAMINATIONS AND THE DISSERTATION

Passing the qualifying examinations and identifying a firm dissertation topic are quite significant events in a graduate student's career. The sooner these things are done, the more expeditiously a candidate can proceed to deal with tasks remaining. As shown in Table 9.9, the faster group in every major area reached these stages of progress after less total attendance time than did the slower group; of the faster group more than 70 per cent passed preliminaries and gained formal approval of a topic before accumulating 3.0 calendar years (12 quarters) in attendance (any institution) while only slightly more than one-half of the slower group did so.

The faster group also differed from the slower group in terms of stage of progress of the dissertation when course and residence requirements for the Ph.D. had been met; some 54 per cent of the former group as compared to 45 per cent of the latter had progressed beyond the "data collection" phase of dissertation research.

This was due, in part, to the fact that more "faster" individuals (a) held research appointments and (b) in such appointments performed work which made a direct contribution to completion of the dissertation requirement. Of those in the "faster" group reporting research assistantships, almost two-thirds (66 per cent) reported that work done was directly applied to the

TABLE 9.8

Comparative Distribution of Years Employed as Research Assistant and as Teaching Assistant For Groups with Longer and Shorter Elapsed Time from the Bachelor's Degree

Group	Research Assistant		Teaching Assistantship	
	Less than 1.0 yr.	1.0 yrs. or more	Less than 1.0 yr.	1.0 yrs. or more
Biosciences				
Faster group	46.0	54.0	53.0	47.0
Slower group	63.8	36.2	44.3	55.7
Physical Sciences				
Faster group	51.7	48.3	50.0	50.0
Slower group	66.5	33.5	48.8	51.2
Social Sciences				
Faster group	64.2	35.8	68.6	31.4
Slower group	79.5	20.5	73.7	26.3
Humanities				
Faster group	93.2	6.8	42.6	57.4
Slower group	94.4	5.6	56.2	43.8
Total				
Faster group	60.6	39.4	53.0	47.0
Slower group	73.7	26.3	55.7	44.3

dissertation whereas only 58 per cent of the "research assistants" in the slower group did so.

Time Taken to Complete Dissertation

Faster individuals tended to complete the dissertation more expeditiously than did the slower group. In the total sample, for 51 per cent of the slower group *at least* two calendar years were required to complete the dissertation after formal approval of a topic but this was true for only 42 per cent of the faster group. For the respective areas, comparable percentages for slower and faster groups, respectively, were as follows: biosciences, 62.0 versus 49.7; physical sciences, 47.8 versus 42.2; social sciences, 34.2 versus 24.4; and, humanities, 66.3 versus 54.4.

So it is evident that for faster individuals the dissertation was begun after less time in attendance and was completed in less total elapsed time.

TABLE 9.9

Years of Graduate Attendance Prior to Completion of Preliminary Examinations and Formal Approval of Dissertation Topic, Respectively, for Individuals Differing in BA-PHD Time Lapse, By Broad Areas

Group	Per cent attaining point before completing the equivalent of 3.0 calendar years of graduate attendance	
	Passed preliminary examination	Topic formally approved
Faster group	70.4	72.2
Biosciences	58.9	65.4
Physical sciences	74.9	72.5
Social sciences	77.3	75.2
Humanities	62.8	74.2
Slower group	53.6	52.2
Biosciences	51.9	61.7
Physical sciences	53.2	47.3
Social sciences	55.7	43.3
Humanities	53.9	65.8
Total	62.1	62.3

THE FOREIGN LANGUAGE REQUIREMENT

To what extent was need for special preparation in order to meet a foreign language proficiency requirement associated with elapsed time? Considering only the two most common languages, namely, French and German, analysis revealed no consistent relationship for French but a quite consistent and significant relationship when German was involved. As indicated in Table 9.10, roughly 66 per cent of the slower group qualifying in German required special preparation while for the faster group who so qualified, only 56 per cent needed special preparation. The relationship was most striking for bioscience and for social science graduates, and the direction of the relationship was consistent in 14 of the 15 fields.

RESEARCH ORIENTATION IN POST-DOCTORAL EMPLOYMENT

In Chapter II it was shown that fields in which "teaching" constituted the major proportion of all predoctoral employment tended to be characterized by longer elapsed time than fields in which the major proportion of all such employment was in the "other professional" category. During the graduate years, moreover, "faster" individuals in the respective fields were more likely than slower individuals to have held a research appointment. And, it is of considerable interest to note that the degree of research orientation in postdoctoral employment, as reported by respondents, is a significant correlate of BA-PHD time lapse.[8] Generally speaking, more faster than slower individuals reported "research" as one of the principal duties in their employment (Table 9.11). In biosciences, for example, of the slower group about 59 per cent reported some research duties whereas over 71 per cent of the faster group did so. In economics and psychology combined (the only social science or humanities fields reporting a workable number of cases with "research" duties) fully 70 per cent of the slower group reported duties in teaching, academic administration, or other categories, *but no research-related duties,* while only 49 per cent of the faster group did so.

In a related type of analysis, it was found that of the indi-

---

[8] Respondents were asked to report principal duties in the position which they held at the time they completed the questionnaire.

TABLE 9.10

Need for Special Preparation to Meet Doctoral Language Requirement in Relation to Length of Program, by Field, for those Qualifying in German

Field	Per cent qualifying in German	Of those qualifying in *German*, per cent requiring special preparation	
		Faster group	Slower group
Biosciences	95.5	52.2	66.7
Botany	95.0	69.6	73.9
Microbiology	98.8	46.3	52.5
Zoology	88.1	45.2	71.4
Other Biosciences	95.2	43.6	69.2
Physicial Sciences	97.0	52.9	57.8
Mathematics	92.4	54.8	57.7
Physics	96.8	59.3	55.9
Chemistry	99.0	38.5	48.2
Engineering	96.0	80.7	82.7
Social Sciences	70.8	66.0	83.9
Psychology	73.7	61.2	83.6
Sociology	62.4	58.1	89.3
Political science	80.3	75.9	78.3
Economics	64.9	82.4	84.2
Humanities	84.9	62.1	72.7
History	74.8	68.4	77.6
Foreign Languages	89.5	44.4	52.8
English	95.1	68.1	83.0
All Graduates	88.9	56.5	66.5

viduals employed in business or industry, 57 per cent were in the faster and only 43 per cent were in the slower group, with the trend being present in most of the individual fields in which any substantial number of individuals were in this employment category. Primarily in the physical sciences, slower individuals were somewhat more likely to be employed by a college or university than by some other type of employer.

FAMILY STATUS

Differences between faster and slower groups in the number of dependents at various stages of graduate study may be thought of both as a more or less natural concomitant of differences in elapsed time and as a factor contributing indirectly (and in some cases directly) to the observed differences. In either case, however, it is evident that a larger number of dependents provided greater potential for financial and psychological problems for those in the slower group at every stage of graduate study as shown in Table 9.12.

Less than one-fourth of the faster group but more than 40 per cent of the slower group reported three or more dependents at time of degree conferral; some 45 per cent of the faster and 61 per cent of the slower group reported two or more dependents when they received the degree. As indicated in Table 9.12, groups were differentiated in respect to number of dependents at each of three points in their graduate careers—entry, beginning of doctoral phase of the program, and time of degree conferral. Particularly striking is the fact that differences are not pronounced at the time of entry into graduate study but that faster and slower groups are substantially differentiated in respect to dependency status at the time the doctoral phase of graduate study was begun (reflecting in part the higher incidence of interruptions of the graduate program *after the master's degree* in the slower group. The smaller proportion of humanities graduates reporting two or more dependents (as defined for income-tax purposes) reflects the presence of a substantially higher proportion of women.

Differences between the faster and slower groups may be pointed up by noting that in the faster group at time of conferral of the Ph.D. the percentage with two or more dependents (45 per cent) was only slightly greater than that characterizing the

TABLE 9.11

Comparison of Faster and Slower Groups in Respect to Principal Duties in Postdoctoral Employment, By Broad Areas

Group	Types of duties reported (per cent)		
	Research and/or research admin.	Teaching *and* research	Teaching, academic admin., and/or other
Biosciences			
Faster group	36.3	35.0	28.7
Slower group	33.9	24.7	41.4
Physical Sciences			
Faster group	64.7	9.9	25.4
Slower group	54.3	9.9	35.8
Economics and Psychology			
Faster group	29.0	21.8	49.2
Slower group	21.7	8.3	70.0
Total			
Faster group	51.7	17.9	30.4
Slower group	43.8	13.1	43.1

TABLE 9.12

Percentage of Faster and Slower Groups Reporting Two or More Dependents at Designated Points in Their Graduate Careers, By Major Area

Group	Beginning of graduate work	Beginning of Ph.D. phase	Time of degree conferral
Faster group	13.0	24.3	44.7
Biosciences	13.5	29.4	54.0
Physical sciences	13.5	23.0	40.7
Social sciences	14.1	27.2	52.4
Humanities	9.9	19.1	35.8
Slower group	18.3	42.0	61.3
Biosciences	20.2	48.5	63.8
Physical sciences	17.2	41.6	60.8
Social sciences	19.7	43.4	66.7
Humanities	17.5	34.4	53.1

slower group *at the beginning of the doctoral phase of their graduate programs (42 per cent).*

OTHER FACTORS

Women constituted a somewhat higher percentage of the slower group than of the faster group. Almost half the slower group indicated that time taken to complete doctoral requirements was greater than they had expected at the outset and about 10 per cent indicated that they had no definite expectations about time; only slightly more than one-third of the faster group took more time than expected while only about 6 per cent did not have definite expectations.

SUMMARY

Generally speaking, the nature of observed differences between faster and slower groups may be summarized by enumerating factors found to be associated with "membership" in the faster group. Accordingly, as compared to their slower confreres, the group of individuals who attained the Ph.D. in better than average time (BA-PHD) for their respective fields was characterized by:

(1) lower incidence and average amount of predoctoral employment
(2) less total time in attendance and less part-time attendance
(3) lower incidence of delayed entry into graduate study and of interruptions thereafter
(4) earlier development of interest in the doctoral field
(5) earlier development of plans for graduate study
(6) earlier development of decision to work toward a Ph.D.
(7) higher incidence of direct pursuit of Ph.D.
(8) greater continuity of major field—undergraduate to graduate
(9) higher incidence of undergraduate and Ph.D. work at the same institution

(10) a broader base of financial support—less reliance on personal savings, and employment unrelated to the graduate program
(11) higher incidence of research-related graduate appointments
(12) earlier completion of preliminary examinations
(13) earlier approval of dissertation topic and more expeditious completion of dissertation
(14) lower incidence of need for special preparation in order to meet the foreign language requirement (German)
(15) higher incidence of research or research-related duties in post-doctoral employment
(16) fewer dependents at all stages of graduate program—at entry, beginning of Ph.D. phase and degree conferral
(17) higher incidence of agreement between initial expectation and subsequent reality in respect to time taken to attain the doctorate.

It should be kept in mind that these relationships obtain for faster and slower groups, defined in terms of rate of progress *relative to appropriate field norms* and that, presumably, they would be somewhat stronger if an absolute, rather than a relative index of rate of progress were utilized.

As noted earlier, the interpretation of the observed differences between faster and slower groups is complicated by the fact that several theoretically relevant variables are not controlled, including the "functional abilities"[9] associated with

---

[9] The plural is used here under the assumption that the "composite" of factors which is theoretically most predictive of speed or quality of student performance in Ph.D. study in one field (or group of fields) is not necessarily most relevant for prediction of similar performance criteria in another field (or group of fields). Unfortunately, very little is known regarding the correlates of "successful performance" in Ph.D. study since there have been comparatively few prediction studies involving advanced graduate students in any discipline. The most comprehensive effort is that of Kelly and Fiske (1951) to predict performance of students in clinical psychology.

In this general context, the problem of determining the suitability of individuals for Ph.D. study in the respective fields *before* they have invested heavily of time, energy and ego in actual study is a significant one. Some years ago, Marcia Edwards (1944) reported, after a series of interviews with graduate faculty at eleven outstanding universities, that "many faculty members considered the end of master's study rather early for a definite decision about the suitability of a doctoral candidate. By far the most frequent opinion was that performance in Ph.D. programs. However, this complication notwithstanding, the results give added emphasis to several factors which have suggested by earlier analyses to be relevant to any comprehensive assessment of the problem of duration, namely, (a) degree of continuity of doctoral study, both temporal and programmatic, (b) timing of development of relevant graduate study and degree goals, (c) degree of research orientation—as reflected in research-related graduate appointments and research-related duties in postdoctoral employment.

---

the doctoral candidate should proceed with his work long enough to give indications of his ability to handle research . . ." (p. 27).

There is obvious need for studies designed to identify the antecedents of successful performance in Ph.D. programs in the various disciplines.

CHAPTER X

Respondents' Suggestions For Time-Reduction

"What can be done to reduce the amount of time taken to earn the doctorate degree in your field, within the framework of existing requirements and without reducing the 'quality' of the degree?"

The quality and comprehensiveness of their replies suggest that the great majority of respondents, both recent graduates and institutional-departmental representatives, gave this question the most thoughtful consideration. Almost two-thirds of the graduates and approximately three-fourths of the institutional respondents offered one or more suggestions, though in both these respondent groups there were differences in response patterns and in the degree of concern evinced by discipline and by broader academic areas.

Responses ranged in character from the terse and unequivocal, "Nothing!," to the extended and analytical expression of a general rationale for dealing with the duration problem. The brief summation in this chapter, aimed at pointing up major trends in the data, cannot avoid some violence to the ideas which were developed at length by many respondents.

TRENDS IN THE RESPONSES OF GRADUATES

Almost two-thirds (63.6 per cent) of the graduates offered one or more suggestions; slightly less than one-fourth (23.9 per cent), with varying degrees of emphasis, replied in such a way as to indicate that they (a) did not favor time-reduction, (b) thought it would be desirable *if possible without quality loss,* or (c) thought that "nothing" could be done about it—and none of these individuals offered suggestions for time-reduction. Only one-eighth of the respondents failed to reply to the question (see Table 10.1).

Roughly 70 per cent of graduates in humanities and social sciences offered suggestions *for time-reduction;* slightly less than one-fifth thought nothing could or should be done and about 11 per cent did not respond. Proportionately fewer science graduates offered suggestions (59 per cent as compared to 70 per cent) and more did not favor time-reduction. However, *in all fields the majority of graduates offered suggestions for reducing time.*

Reasons for Not Favoring Time-Reduction

The nature of the responses of those not favoring efforts aimed at "time-reduction," or not believing such reduction to be feasible, is of considerable interest in that the reasons given point up questions which need to be carefully considered by all those concerned with this problem. These responses are summarized in Table 10.2 which shows the percentage *of those not favoring time-reduction* whose responses fell in the various categories, by broad academic areas.

(1) Generally speaking the most frequently mentioned opinions were that (a) it would be difficult to reduce time without reducing quality and (b) that time now required is reasonable and/or valuable. Taking into account the higher proportion of all natural science graduates *not favoring time-reduction,* it is clear that these opinions tend to be more prevalent generally among science graduates than among social science and humanities graduates.

(2) Some 19 per cent of these particular respondents felt that in view of the rapid increase in knowledge, and for other reasons, there should be some *broadening of requirements* for areas of concentration, possibly involving even more time, and about 5 per cent actually suggested *that more time would be desirable.*

(3) The feeling that time taken to attain the doctorate is primarily a function of the individual—his functional abilities, motivations, background, etc.—was expressed by about one-eighth of the group, with humanities graduates being least inclined to give this particular response.

(4) That development of "professional maturity" cannot be greatly accelerated—that it "takes time"—was offered as a

TABLE 10.1

General Nature of Response Elicited by the Question, "What Can Be Done To Reduce Amount of Time Taken to Earn A Doctorate . . .?" By Field

Field	No response		Thought nothing could or should be done		Suggested ways of reducing time	
	No.	Per cent	No.	Per cent	No.	Per cent
Biosciences	33	9.8	102	30.4	201	59.8
Botany	7	6.9	36	35.6	58	57.4
Microbiology	13	15.3	26	30.6	46	54.1
Zoology	3	4.5	16	23.9	48	71.6
Other	10	12.0	24	28.9	49	59.0
Physical Sciences	129	15.3	214	25.4	501	59.4
Mathematics	23	17.6	31	23.7	77	58.8
Physics	14	11.3	21	16.9	89	71.8
Chemistry	65	15.7	117	28.3	232	56.0
Engineering	27	15.4	45	25.7	103	58.8
Social Sciences	44	10.5	81	19.4	293	70.1
Psychology	23	11.8	39	20.1	132	68.0
Sociology	11	10.9	19	18.8	71	70.3
Political Sci.	7	10.6	15	22.7	44	66.7
Economics	3	5.3	8	14.0	46	80.7
Humanities	36	10.9	64	19.3	231	69.8
History	13	9.1	19	13.3	111	77.6
Language	12	14.0	14	16.3	60	69.8
English	11	10.8	31	30.4	60	58.8
All Fields	242	12.5	461	23.9	1226	63.6

TABLE 10.2

Classification of Responses of Those Who Indicated That Time Could Not or Should Not Be Reduced

Response category	Per cent in designated response categories*				
	Biological sciences	Physical sciences	Social sciences	Humanities	Total
Unelaborated negative (e.g., "nothing")	6.9	7.9	17.3	17.1	10.6
More time actually desirable	6.9	4.7	4.9	6.2	5.4
Development of "maturity" takes time	7.8	5.1	8.6	9.4	6.9
Time taken is primarily a function of individual	14.7	13.1	13.6	6.2	12.6
Time required is reasonable and/or valuable	21.6	27.1	13.6	21.9	22.8
Cannot reduce time without reducing "quality"	24.5	25.7	21.0	25.0	24.5
Areas of concentration should be broadened	21.6	18.2	23.4	12.5	19.1
Miscellaneous	2.0	1.9	2.4	3.2	2.0
No. not favoring time-reduction	102	214	81	64	461
Per cent of total	30.4	25.4	19.4	19.3	23.9

*Column totals may exceed 100.0 per cent since some individuals cited more than one reason. Percentages based on those not favoring time-reduction only.

reason for not favoring efforts at time-reduction by about 7 per cent of the entire group.

These arguments which may be thought of as representing a "minority report" must be given careful consideration.

Suggestions for Time-reduction

Suggestions for expediting the process of doctoral preparation were classifiable into seven major categories, and one "miscellaneous" category, as shown in Table 10.3.

The number of suggestions offered was great and no *single* type of suggestion dominated the response pattern. In fact, five areas of concern each accounted for some 25 per cent or more of respondents: suggestions related to *financial assistance* (35.4 per cent); *advisement, counseling, and individual program planning* (30.1 per cent); *the dissertation and research* (25.0 per cent); *organization of graduate courses and curricula* (24.7 per cent); and the *foreign language requirement* (24.4 per cent). Changes in a variety of *administrative policies and procedures* were recommended by some 13.5 per cent, and 12.5 per cent emphasized the importance of *strengthening undergraduate preparation*. Responses in the miscellaneous category, accounted for less than 2 per cent of *all responses given*.

While some differences obtained among major academic areas, the general trends were quite similar. In the sections which follow, the characteristic responses within each of these general categories will be considered *for the sample as a whole*.

Financial Aid. The general theme of most of these responses was the provision of *more financial assistance:* e.g., provide more money for assistantships and fellowships, make more research grants available, *fully* subsidize expenses on campus. A strong secondary theme was that of more "outright grants," "fellowships," to obviate the need for part-time employment; and, related to this theme, the recommendation that if work is necessary *it should be related to the graduate study program of the individual*. Financial support for dissertation research was mentioned by a significant number of respondents.

Advisement, Counseling, Program Planning. About 30 per cent of the graduates offering suggestions for time-reduction indicated a need for improvement in the area of advisement, counseling, and individual program planning. Within this broad category, the two most frequently mentioned types of suggestions

TABLE 10.3

General Classification of Graduates' Suggestions for Time-reduction, by Major Area

Suggestion related to	Per cent offering suggestions*				
	Bioscience	Physical Science	Social Science	Humanities	Total
Financial aid	37.3	31.1	37.5	40.3	35.4
Advisement, counseling and program planning	31.3	30.1	33.4	24.7	30.1
Dissertation and research	21.4	27.5	23.9	24.2	25.0
Organization of courses and curricula	25.4	25.7	23.2	23.8	24.7
Foreign languages	23.9	15.4	39.2	25.5	24.4
Policies, procedures, and requirements	15.4	16.2	13.0	6.5	13.5
Undergraduate preparation	14.4	16.8	8.2	6.9	12.5
Miscellaneous	2.5	3.4	4.1	3.9	3.5
Total number offering suggestions	201	501	293	231	1226
Percentage offering suggestions	59.8	59.4	70.1	69.8	63.6

*Column totals exceed 100.0 per cent due to the fact that most individuals offered more than one suggestion.

pertained to (a) the provision of more and earlier individual counseling with emphasis on systematic program planning and the establishment of greater degree of understanding of individual responsibilities, institutional and departmental expectations and the like, and (b) the establishment of closer and more continuous relationships with faculty advisers to permit better supervision of student progress throughout the graduate program.

Other themes pertained to the development of more adequate procedures for the recruitment and advisement of potential graduate students *at the undergraduate level* and the need for more adequate *information* at the graduate level regarding, for example, the research interests of various faculty members, the nature of course requirements, etc.

Dissertation and Research. In this area suggestions fell into several categories relating to (a) timing of initiation of dissertation research, (b) selection of the dissertation topic, (c) faculty responsibilities in supervising dissertation research, (d) better preparation for research, (e) more and better equipment and facilities—laboratory, computing, library, etc., and (f) the nature and purpose of the dissertation.

Recent graduates suggested emphatically that *dissertation research should be initiated earlier;* that topics be selected more carefully and problems designed so as to make them more amenable to treatment; that "limits" and "responsibilities" be clearly understood in connection with particular projects; that the faculty provide "more adequate guidance before and during thesis research, including *writing";* that training in "research techniques" be initiated earlier; and, that there should be a closer relationship between course work and the dissertation. Some individuals suggested that more emphasis be placed on quality and less on quantity, and that the "contribution to knowledge" emphasis should be replaced by attention to the dissertation requirement as a test of the individual's ability to "do research."

Organization of Courses and Curricula. The encouragement of more advisement and counseling was motivated in part by the assumption that this would help *the individual* establish a more "structured" set of goals and objectives for the period of graduate study. The most important single theme in the suggestions regarding graduate courses and curricula was that of establishing *a more structured core of graduate courses* and, related to this objective, of eliminating "dead-wood" or duplication in courses. These two themes accounted for more than one-half of all suggestions included in this area. The remaining suggestions were quite varied in nature: e.g. facilitate transferability of credit through establishing greater uniformity *over institutions* in course offerings of given fields; offer more "practical" courses; give more emphasis to research implications of course work, etc.

Foreign Language Requirement. It will be recalled that recent graduates in social sciences and humanities as compared to those in science fields, more frequently considered "inadequate undergraduate preparation in foreign languages" to have been a "lengthening" factor in their doctoral program. In Table 10.3, it is clear that graduates in these two areas, particularly those in the social sciences, more frequently offered suggestions relating to the language requirement. In the total sample, three themes were dominant among the suggestions made: (a) abandon language requirement or modify it, (b) encourage more and better undergraduate preparation in foreign languages, and, (c) provide adequate means for training graduate students in languages.

In general, the theme in those responses favoring *modification* was that of substituting other "more functional" subjects for at least one language; or, simply, requiring only one language rather than two.

Policies and Procedures. Some 13.5 per cent of all those making suggestions for improvement mentioned the need for change in a variety of administrative policies and procedures, with no general theme apparent. Among the ideas emphasized were the following: identify promising students and do not require them to earn a master's degree; eliminate weak students early; require earlier completion of preliminary examinations; do away with "credit counting" by more general use of examinations; place no "load limit" on graduate students; establish more definite "time requirements", increase "flexibility" of graduate school policies—take the individual into account.

Undergraduate Preparation. The theme here was simple—that undergraduate preparation should be strengthened. By reference to Table 10.3, we find that this theme was given greater emphasis by science graduates than by social science and humanities graduates; roughly 15 per cent of the combined natural science fields mentioned this point.

TRENDS IN THE RESPONSES OF INSTITUTIONAL-DEPARTMENTAL REPRESENTATIVES

The types of suggestions made by institutional-departmental representatives were quite similar to those proffered by their former students, hence will not be elaborated in detail. The feeling that little or nothing could, or should be done in the matter of "time-reduction" was most prevalent among natural science faculty and least prevalent among social scientists, humanists, and graduate deans (see Table 10.4).

Generally speaking, natural scientists tended *not* to emphasize suggestions related to research and the dissertation or to the foreign language requirement, areas which were relatively

TABLE 10.4

Suggestions of Institutional-Departmental Representatives for Time-Reduction

General suggestion	Rank of suggestion within respondent category (frequency of mention)				
	Grad. deans	Phys. sci.	Biol. sci.	Soc. sci.	Humanities
Provide more adequate financial support	1	1	1.5	1	1
Develop and implement a more distinctive set of expectations (curricular and other)	2	3.5	5	2	2.5
Strengthen undergraduate preparation	3.5	3.5	4	5	2.5
Improve practices in respect to the dissertation and research	3.5	8	6.5	3.5	5
Improve or modify certain graduate school policies, practices, and procedures	5.5	5	3	7	5
Reconsider and/or modify the foreign language requirement	7	6.5	6.5	3.5	5
Improve selection procedures	8	6.5	8	7	7.5
Little or nothing can or should be done	5.5	2	1.5	7	7.5

strongly emphasized by graduate deans and social science faculty. Nor were natural scientists as likely as other respondent categories to urge need for development of more distinctive and explicit expectations regarding curricular and other requirements for the doctorate.

All groups suggested that more adequate financial support was a necessary element in any program aimed at "time-reduction."

AN OVERVIEW

In brief, the majority of respondents indicate by their proffered suggestions that they believe that the average amount of time taken to attain the doctorate can be reduced without reducing the "quality" of doctoral preparation and, in the main, without basic modification of existing requirements. Some do not hold to this view and some have reservations about stress on expediting progress rather than "improving quality." However, the majority do not view these two emphases as necessarily contradictory.

Among both faculty and student groups, it would seem that respondents in natural science fields tend to take a more sanguine view of the duration issue than respondents in other fields or graduate deans.[1] Yet, a majority of individuals in every respondent category suggested one or more ways in which some reduction in time expenditure might be achieved.

In capsule form, the respondents collectively suggest that if significant progress is to be made toward the ultimate goal of reducing the total amount of time involved in the process of doctoral preparation, several things must be done:

(1) Ways must be found to insure more adequate amounts and more appropriate forms of financial assistance to graduate students in order to minimize reliance for financial support on income derived from employment which is not directly related to the graduate program and to encourage greater continuity of effort.

(2) There must be developed within the respective depart-

---

[1] Institutional-departmental representatives were asked: "Do students, on the average, take more time than is desirable in completing their doctoral programs?" Of natural science faculty, only 41 per cent said "yes," while 60 per cent of the deans, 62 per cent of the social science faculty, and 75 per cent of the humanities faculty did so. Because of the relatively small size of the sample, these percentages should not be stressed. However, the trends are entirely consistent with expectation.

ments and in the graduate school, distinct and consistent patterns of expectations with respect to the understandings, skills, and competencies which a candidate is expected to exhibit; with respect to the general curricular structure defining the heart of each discipline; with respect to the content areas to be covered in examinations; with respect to the timing of examinations within the context of other specific and general requirements.

(3) Institutional-departmental patterns of expectations and requirements must be implemented by the provision of more adequate advisement, counseling, guidance, and supervision of students. More specifically, with due regard for the crucial importance of intellectual independence, careful consideration must be given to (a) encouraging closer relationships between students and advisers, (b) initiating careful diagnostic procedures (examinations and interviews) early in the graduate program in order to determine students' strengths and weaknesses, (c) encouraging more careful planning of program by students, and (d) providing more adequate information about departmental programs, requirements and expectations.

(4) Moreover, a great deal hinges on the possibility of improved articulation between undergraduate and graduate programs, and the more widespread and more effective use of procedures for the early identification and counseling of "potential graduate students." The achievement of a greater degree of articulation of undergraduate and graduate study leading to the Ph.D. in various disciplines will be contingent in part on the more specific definition of "degree requirements," but it is also contingent upon the development of more effective recruitment and counseling practices at the undergraduate level.

(5) Among traditional requirements for the Ph.D., special attention must be given to improving practices relating to research and the dissertation and foreign languages.

In essence, the amount of time involved in doctoral preparation can be reduced, our respondents indicate, only through concerted effort on a variety of fronts. Solutions predicated on a monistic conception of the problem will not prove to be satisfactory and no approach to "time reduction" stressing only one line of attack, e.g., increased financial support, improved practices, etc., will be *sufficient,* however necessary it may be to an overall solution.

CHAPTER XI

Toward Further Understanding And Effective Action

The major focus of concern over the "duration" of doctoral study is not the amount of time students spend within the formal preparation system (i.e., engaged in activities in or under the aegis of the graduate school) but the amount of time spent outside the system (i.e., engaged in activities not directly related to the completion of degree requirements). Relatively few recipients of a Ph.D. degree (only about a fourth of those surveyed in this inquiry) were *in graduate school* for a total of more than 20 academic quarters (the equivalent of five calendar years). For many, however, progress toward the doctorate was marked by discontinuity—temporal and/or programmatic. As a consequence, Ph.D. attainment time as measured in terms of the time span between entry into graduate school and attainment of the doctorate (or in terms of BA-PHD time lapse) was characteristically greater, and in many instances *much greater,* than that reflected in the "graduate attendance" data.

Entry-PHD time-lapse medians, it will be recalled, ranged from a low of about five years (chemistry, engineering, and botany) up to 10 years (English, foreign languages) as compared to attendance medians ranging around four calendar years. And, *only one graduate in seven actually attained the Ph.D. within four years following entry into graduate school.*

In view of the expansion of knowledge in every discipline, it is reasonable to assume that the amount of time normally spent in graduate school (about four years) is not amenable to any significant downward adjustment. (In fact, an *increase* in the average amount of time devoted to doctoral study, within the formal preparation system, is probably a *necessary* condition for accelerating Ph.D. production in some fields). Thus, the concept of reducing the amount of time taken to get a Ph.D. degree does not imply a reduction in the time actually devoted to such preparation but rather primarily a reduction in the amount of time devoted to activities (in or outside the preparation system) *which do not contribute directly to completion of degree programs or attainment of the objectives of Ph.D. preparation.*

As Berelson has put it (1960, pp. 234-235),

> [The Ph.D. preparation] period has spread out too far, is discontinuous for too large a proportion of students, and is filled out with off-campus study for too many. [And, he adds] it is better for all concerned if the work is done more speedily (in elapsed time), more consecutively, and more locally. In addition to better academic work, this should make for less attrition and less anxiety, for larger numbers of completed products in the decade ahead, for less premature employment of ABD's in the colleges, for longer careers, for more natural enthusiasm and energy on the first jobs.

The general problem of acceleration, then, is how to get students into and through the Ph.D. preparation sequence as efficiently, regularly, and rapidly as possible consistent with the demands, requirements, and objectives of Ph.D. study, the abilities and circumstances of individual students, and the general exigencies of career development.

DISCONTINUITIES IN THE PH.D. PREPARATION PROCESS

Delays and discontinuities in the Ph.D. preparation process which contribute most directly to the "Ph.D. stretch-out" tend to occur principally in connection with (a) patterns of entry into the preparation system—*delayed entry into graduate school,* (b) interrupted study patterns, particularly interruptions in graduate study following conferral of a master's degree—*the post-master's hiatus,* (c) changes in graduate institution—*the transfer pattern* and (d) delayed, off-campus completion of the dissertation after other degree requirements have been met—*the ABD pattern.*

There are, it will be recalled, marked disciplinary variations with respect to each of these problems but they are present to some extent in every field of study and must be dealt with in implementing any plan designed to increase the continuity and regularity of student progress into and through the doctoral preparation process, following conferral of a bachelor's degree.

Delayed Entry into Graduate School

For approximately one-third of the respondents to this inquiry there was some delay between college graduation and entry into graduate school. Among those delaying entry, more than 40 per cent cited "inability to finance a desired program of graduate studies" as a factor and more than a third cited "military service" as an associated factor. However, approximately a third cited uncertainty regarding career-related goals and about a fourth of those delaying entry noted that their plans at the time did not include graduate study.

It is important to keep in mind in this context that entry into graduate school does not connote "entry into doctoral study." The process whereby an individual comes to be recognized by others and to think of himself as a "doctoral student" takes place largely after entry into graduate school, and this "induction process" tends to be relatively prolonged, characteristically ambiguous, and often anxiety-provoking. By way of comparison induction into medical training, for example, is relatively clearly demarcated (psychologically, temporally, and programmatically) being more or less synonymous with the act of admission to medical school (and induction-related anxiety is dissipated prior to entry into the system—for the successful applicant at any rate). This is clearly not the case in the context of graduate education.

Only about 30 per cent of the Ph.D. recipients in this inquiry indicated that they were definitely "doctorate oriented" when they graduated from college although over seven in 10 had definite aspirations for graduate study at the time. "Attainment of the Ph.D.," therefore, normally represents an emergent, rather than an early-established, directive goal. The extent to which timing of development of Ph.D. orientation is amenable to systematic modification cannot be assesssed here. We do know that, in general, early establishment of relevant graduate study and degree goals, logically conducive to continuity of educational progress and program planning, was associated with expeditious attainment of the doctorate in every field.

Systematic attention to the problem of identifying and counseling all "potential graduate students" and particularly potential Ph.D. students (along lines followed, for example, at Tulane University) and the more widespread adoption of programmatic formats which effectively articulate undergraduate and graduate study (such as the three-year master's program proposed by Carmichael) may be thought of as illustrative of elements in a comprehensive strategy which might accomplish not only a significant reduction in the incidence of delayed entry into graduate school but also the earlier establishment of Ph.D. orientation, so that the individual's entire graduate experience might be better planned and coordinated.

The Post-Master's Hiatus

We have seen that 87 per cent of the Ph.D. recipients in this study earned a master's degree, in a "stepping stone" approach to the doctorate, and that of these individuals approximately 35 per cent interrupted their programs of study following conferral of the master's degree. According to their own reports, interruptions were due mainly to financial problems, family obligations, military obligations, and factors related to the area of goal development and clarity of purpose—uncertainty regarding disciplinary interest, uncertainty regarding choice of institution at which to continue graduate studies, and *lack of doctorate orientation* (actually, of the master's holders who interrupted, more than three in 10 indicated that they thought of the degree as terminal at the time).

There is, of course, no way of knowing from the findings of this inquiry just what proportion of the interruptions following conferral of a master's degree was due to theoretically avoidable factors and what proportion was due to factors which may not be amenable to systematic modification. Nor can the contribution of the interim experience (often in teaching service in a college setting or in grades 1-12) to the individual's professional growth be assessed here in any systematic way (although in program planning, questions must be raised regarding matters such as the contribution of time spent outside the formal preparation system during the BA-PHD period to the "making of a Ph.D." and the contribution of predoctoral, career-related employment to attainment of the objectives of Ph.D. programs).

Generally speaking, there may be some instances in which a "leave of absence" from the formal preparation system (or delayed entry into graduate school) may be beneficial, and some individuals may profit more from a year or two of "practical" (career-related or other) experience outside the preparation system, per se, than from a comparable amount of time spent "under the aegis of the graduate school." However, the supposed advantages, from an educational point of view, of a break in the preparation sequence after a master's degree (or at any time prior to completion of degree requirements for that matter) to grow or mature "on one's own" should be critically examined and assessed in terms of the possible alternative of *planned progress* through a period of career-related experience (as in college teaching) *under the aegis of the graduate school.* For it is obviously *possible,* given a desire to do so, to incorporate *within the formal preparation system* and on a programmatic basis whatever amounts and types of "professional experience" might be deemed necessary to the accomplishment of the major objectives of Ph.D. programs in the respective fields.

Under prevailing conditions, completion of a master's program represents a convenient and "natural" point of egress from the formal preparation system. And, all too frequently, the later resumption of studies represents the superimposition of a Ph.D. oriented segment of graduate study on previously completed work to which, by virtue of a change in institution or in specific interests, or simply the erosion of time, it has only a historical, not a genuinely programmatic tie.

Assurance in the form of planned patterns of financial support "for the duration" contingent upon satisfactory progress; incentive to make definite commitment of time, energy, and resources to "complete a degree program," in the form of a reasonable degree of certainty regarding the *amount* of time likely to be involved (on actuarial as well as theoretical grounds); systematic efforts to identify and advise all "potential Ph.D. students" among those in master's programs—all these represent conditions conducive to increasing the continuity of progress toward the doctorate.

From a conceptual and operational point of view, the question of direct pursuit of the doctorate versus the stepping-stone pattern which now prevails should be examined carefully. Systematic examination of this question should be designed to clarify the whole matter of the functional relationship between the master's and the post-master's phases of the predoctoral period. It is difficult to assess the general feasibility of "the direct Ph.D." under a variety of conditions since the majority of graduates still take a stepping-stone approach and there is little empirical evidence of the relative operational or educational efficiency of the two approaches. It is clear from this inquiry that the direct Ph.D. is associated with somewhat faster attainment times[1] but important individual and situational variables have not been controlled.

Transfer Patterns

Respondents followed a variety of institutional attendance and degree patterns en route to the doctorate and approximately one-half attended more than one graduate school. The major patterns were as follows:

1) *The non-transfer pattern (51%)*
    a) direct Ph.D. by-passing the master's (12%)
    b) the master's-doctorate degree pattern (39%)

2) *The transfer pattern—regular (32%)*
    a) master's degree at Institution A, Ph.D. at Institution B

3) *The transfer pattern—irregular (17%)*
    a) typically involving a master's degree, but characterized basically by attendance at two or more graduate schools with *some non-degree work* at one or more.

---

[1] In a survey of the first Ph.D. recipients under NDEA Title IV, Arlt (1963) reports that 102 individuals out of a total of 1096 who had received a two-year fellowship under this title either in September 1959 (1000 students) or in September 1960 (96 individuals) had earned the Ph.D. by the end of 1962 (less than 10 per cent of the original award group). Of the 96 responding degree recipients, almost half were in the sciences. Of greatest interest at this juncture, however, is the fact that in this "fast" group, almost half (46.9 per cent) of the respondents said they did *not* "earn a Master's degree on the way to the doctorate." Thus, in this group, characterized by speedy attainment of the Ph.D., a disproportionately high percentage by-passed the master's degree.

The relative educational merit of these major patterns is not here at issue. The findings of this study indicate only that the pattern followed is likely to affect time taken to attain the degree —quite logically, greater institutional and programmatic continuity is associated with less time taken. Approximately one-fifth of all respondents, with but little variation according to field, noted that transferring "lengthened" time taken to get the degree.

In their recent analysis of the graduate education of historians, Perkins and Snell (1962 pp. 180-181) suggest that encouragement of students "to do all their graduate work in a single institution" is one of several ". . . basic devices to speed the training process. Changing graduate schools after a year or so of study is a stimulating and broadening experience, but (they add) it contributes to the Ph.D. stretch-out."

Many institutional changes may be the result of fortuitous and uninformed initial choice of graduate school. Thorough evaluation of this general question will require research into the basic process through which students choose (are distributed to) institutions, departments, and major professors; the major sources of dissonance in individual-contextual patterns; and the reasons for change in institution.[2]

The welfare of the individual student, the demands of the discipline, and substantive educational considerations should, of course, be given top priority in assessing the relative merits of "attendance patterns." Within limits imposed by such considerations, however, efforts designed to reduce the incidence of "irregular" and transfer patterns should be a part of any overall attack on the duration problem.

The ABD Pattern

"Regularization" of performance with respect to the research requirement, while maintaining the basic values of independent intellectual effort, constitutes a major challenge to the effective implementation of any plan for improved efficiency and continuity in graduate education. For substantial irregularity and uncertainty in the Ph.D. preparation process occurs in connection with the completion of the research requirement. Up to half the degree recipients in some fields completed the dissertation off-campus during a period of full-time employment after having completed other requirements for the Ph.D. (the ABD pattern), and the off-campus dissertation was among the five leading "lengthening factors" cited by respondents.

---

[2] For some evidence regarding the correlates of transfer status among graduate students, see Davis (1962, pp. 279-281, p. 115, and *passim.*).

Judging from the findings of this inquiry, there is marked variability among individuals in regard to the timing of initiation of dissertation research in relation to completion of other degree requirements, and in speed of completion of the dissertation thereafter. For example, at time of completion of course and residence requirements for the doctorate, one eighth of the respondents had *completed* the dissertation while a comparable percentage had not yet hit upon a topic! Some 28 per cent gained formal approval of a topic before completing their eighth academic quarter in attendance while 38 per cent completed at least 12 academic quarters of study before topic approval. And, 18 per cent required three or more years to complete the dissertation while 17 per cent required less than one year (measured from time of formal approval of topic.)

Many individuals initiated dissertation research relatively late in their graduate careers and thus increased the likelihood of off-campus completion. Of course, a state of readiness to initiate the dissertation research cannot be induced by fiat to conform to a Procrustean time schedule nor can the gestation period for dissertations, measured from conception of a topic to delivery of the contribution to knowledge, be made to conform to a "standard" law.

It is reasonable to assume, however, that better general organization of graduate work, more effective guidance for students in the selection of researchable topics, efforts to facilitate earlier initiation of work on the dissertation, encouragement of shorter dissertations, placing greater stress on the dissertation as a "work-sample" test of research potential and less on the "contribution to knowledge" (all of which have been suggested by respondents to this inquiry as well as by others concerned with the problem) represent practical and potentially effective, mutually reinforcing steps which can be taken to reduce delays and discontinuities in progress toward the doctorate due to delayed initiation and/or off-campus completion of the dissertation.

From the standpoint of program planning, it is important to recognize that the typical graduate in most fields required approximately two years to complete the dissertation following "formal approval" of the topic; about eight graduates in 10, however, completed the dissertation within a three-year period. The extent to which these figures might be compressed by effective implementation of procedures such as those outlined above cannot, of course, be estimated with any degree of accuracy.

DISCIPLINARY DIVERSITY

The findings of this inquiry reveal marked differences among the fields studied in respect to the characteristic course, patterning, duration, career-related concomitants, and general circumstances of Ph.D. preparation. Systematic assessment of the factors which account for these differences remains a matter for further research. It is assumed, however, that both "intrinsic" and "extrinsic" factors must be taken into account in efforts to "explain" the discipline-related variations in the data.

Generally speaking, graduates in the natural science fields tended to attain the Ph.D. more rapidly (as reflected in time lapse averages—BA-PHD, Entry-PHD, and MA-PHD) than their counterparts in the social sciences and humanities and the PH.D. "stretch-out" was most pronounced in the humanities fields.

In rationalizing the more expeditious attainment of the Ph.D. by natural science students, graduate deans and faculty participants cited factors ranging from "the more structured and definitely sequential nature of knowledge in the sciences," to the more "natural relationship of research to other facets of Ph.D. programs in the sciences," to more adequate levels and appropriate forms of financial support for graduate students in the science fields (conducive to greater continuity of study), to conditions of the market place which make early completion of the Ph.D. a more attractive goal for science students than for those in other fields.

Whatever the ultimate explanation of the underlying dynamics may be, among-field differences in time-lapse averages were closely associated with a cluster of variables reflecting the characteristic degree of continuity of student progress (temporally, programmatically, and institutionally), the manner in which the research requirement was met, the typical career orientations of students, and amount and form of financial support reported by students. In more specific terms, the ranks of the fields in respect to average time lapse tended to correspond closely to the ranks of the fields in respect to the following interrelated variables (see Appendix C for detail):

a) incidence of irregular of discontinous patterns of progress toward the doctorate (e.g., percentage of postmaster's interruptions, percentage of "irregular" institutional-attendance and degree patterns)

b) percentage of graduates completing the dissertation off-campus and average time taken to complete the dissertation following topic approval

c) percentage of graduates following "teaching oriented" rather than "research oriented" careers (e.g., percentage reporting predoctoral employment in college or other teaching service, percentage reporting *no* research duties in postdoctoral employment)

d) percentage of graduates reporting "financial problems" and "family obligations" as factors which lengthened time taken to attain the degree.

Thus, there are important discipline-related variations having relevance for the duration question which should be taken into account (and "accounted for") in further discussion and research.

One implication of these discipline-related variations in the data is, of course, that the problem of expediting the Ph.D. preparation process varies in degree of urgency, complexity, and probable difficulty of resolution from one group of disciplines to another. A second implication is that the process of doctoral study in each discipline is—in different ways and to different degrees—like that in *all* other disciplines, like that in *some* other disciplines, and like that in *no* other discipline. And, a third implication is that given the marked variations in what doctoral students study, how they study it, and what they study it for—and associated differences in rates and patterns of progress toward the doctorate—a single conceptual model cannot be expected to accommodate without strain the diverse demands and circumstances attendant upon doctoral preparation in every field. That is, given fields which differ as profoundly as chemistry and English, engineering and political science, or microbiology and sociology in content, methods of research and analysis, level of theoretical development, and the career roles and expectations characteristic of graduates, *diversity rather than uniformity* of concept and format is called for in Ph.D. programs.

Career Roles versus Program Emphases: A Case In Point

Great potential for conflict, strain, and dissonance derives, for example, from the fact that there are marked differences among disciplines in respect to the characteristic career expectations of and the range of basic *career roles* available to graduates. The predominant emphasis in doctoral study, traditionally and currently, is on the development and cultivation of research or scholarly skills and competencies and the research component of Ph.D. programs epitomizes the ultimate locus of faculty interest and concern. Yet *most* doctoral aspirants in *some* fields are not destined to pursue careers devoted exclusively or even primarily to a research *role*.

We are reminded by the data in Table 11.1 that for graduates in the humanities fields (English, foreign languages, and history) the ultimate context of employment was almost always a college or university and the major career *role* that of "teacher." For graduates in the social science fields, to whom a broader (and ever broadening) range of career roles (researcher, professional practitioner, etc.) is available, within as well as outside the academy, a majority in each of the fields under consideration here (except psychology) still tended to find their major career roles (from one to ten years after the doctorate was conferred) within the framework of an academic, *teaching* context, though with a definite increase over humanities graduates in the *formal* conjunction of teaching *and* research responsibilities. In the biological sciences a majority tended to gravitate toward academic contexts, but the pattern of duties reported reflects a definite shift in emphasis—a majority of graduates were in positions involving research, or research in conjunction with teaching responsibilities. And, at the other extreme from the humanities, not only were relatively few physical scientists in academic employment (exclusive of those in mathematics which, like psychology among the social sciences, constitutes a "special case") but even fewer reported primarily teaching or administrative duties; the preponderant majority reported research-related duties.

Although both preparation for teaching and preparation for research have been recognized as important tasks of the graduate school, it is fair to say that only research training has been fully institutionalized—i.e., formally accommodated within the tradi-

Table 11.1

Variation Among Disciplines in Respect to Postdoctoral Employment in Educational Service and Principal Duties of Ph.D. Graduates: Study Sample

Fields*	Per cent in educ. service	Principal duties in postdoctoral employment**		
		Res. & res. admin.	Res. & teaching	Teaching and/or admin.
English	92	0	5	88
History	92	5	6	83
Foreign Languages	93	0	5	87
Economics	75	10	33	42
Political Science	95	3	18	73
Sociology	84	14	24	55
Mathematics	69	21	15	48
Other Biosciences	74	19	39	31
Zoology	70	30	27	39
Botany	63	40	26	24
Microbiology	56	46	33	9
Physics	39	65	18	11
Psychology	32	29	10	16
Engineering	25	49	7	17
Chemistry	24	74	6	13

*Fields in special type are the fields of longer duration (all time lapse indices).

**Percentages for the respective duty categories do not total to 100 per cent due to exclusion of duty categories not involving either teaching, research, or academic administration.

tional pattern of degree requirements for the Ph.D. and, equally important, the characteristic value and rewards system of the graduate school.[3]

In such a context, efforts to provide "special preparation" for teaching roles (through various devices and strategies, formal or informal) have tended to be perceived, assessed, valued, and treated as extraprogrammatic rather than as an integral part of the basic preparation of Ph.D. students—even those destined to pursue careers in educational service devoted primarily to teaching duties. And, the teaching assistantship often has been thought of as a chore imposed by economic necessity rather than a developmental experience *which ought to be a part of training for the Ph.D.* (which may help to explain, in part, the fact that "work as a teaching assistant" was ranked among the leading five "lengthening factors" by graduates *although such assistantships provided a major source of their financial support*).

Under these conditions, teaching-oriented Ph.D. aspirants may find the general climate of the graduate school less hospitable than their research oriented confreres, and accommodation to the exigencies of doctoral study more difficult. They may respond in a variety of ways—e.g., by dropping out of the system, temporarily or permanently (Davis, 1962, pp. 111-115) or by shifting their orientation in the direction of greater congruence with the primary "research" emphases of the graduate school (Gottlieb, 1961, p. 237). In general, it is reasonable to expect that the student whose professional aims and values are consistent with those of the graduate school is likely to move more expeditiously, smoothly, and enthusiastically through the preparation process than the student whose aims and aspirations run counter to prevailing values.

---

[3] Although there is disagreement within the graduate school as to what graduate study is primarily for, training for research and training for teaching are recognized as central (Berelson, 1960, pp. 42-69). Asked to rank the "major tasks of the graduate school," humanities faculty surveyed by Berelson gave highest rank to "training college teachers." "Training research scholars," second-ranked by humanities faculties, was first-ranked by physical, biological, and social scientists.

However, as for *actual emphasis* a majority of the faculty in *every* arts and science category indicated that currently emphasis was more for *research* than for teaching, and a majority in every disciplinary category indicated either "more for research" or "about equivalent" emphases on research *and* on teaching, as the balance which *should* obtain.

Only a minority of the faculty members surveyed in arts and sciences (ranging over disciplinary categories from 23 per cent among physical scientists to 37 per cent among humanities faculty) agreed with the proposition that "the graduate schools unduly stress research and research training at the cost of properly preparing college teachers," although in all disciplinary categories there was a tendency to recognize that there was *too much* emphasis [on research] as matters now stand. Thus, as Berelson summarized, "The general feeling seems to be: more attention to teaching, but not so much as to shift the balance."

That the conflict here implied between career roles and programmatic emphases is real and that it affects basic attitudes toward doctoral study (in ways having relevance for the duration issue as well as for broader concerns) is suggested in findings reported by Berelson (1960, pp. 91-92). The proposition that "doctoral work suffers because many students don't really want to be researchers but have to go through research programs in order to get the 'union badge' for college teaching," was agreed to by 70 per cent of recent recipients in the humanities in his national sample and 55 per cent of those in the social sciences (and similar proportions of the faculty as well) *as compared to only 30 per cent in the natural sciences and engineering.*

From the point of view of the duration issue, it will be noted that the fields in which there was a *low* degree of congruence between the characteristic research emphasis in Ph.D. work and the actual career patterns and roles of graduates (e.g., the humanities) the duration problem is most urgent (and attitudes most unfavorable). In general as the degree of congruence between career roles and traditional programmatic emphases decreases over fields, the average duration of the preparation process (elapsed time) tends to *increase* (see Table C-2, Appendix C).

Circumstances of this kind, it is believed, illustrate forms of dissonance engendered by a tendency toward standardization of priorities in program emphases, values, and rewards systems across the disciplinary board without regard for significant differences among fields (or within fields for that matter) in the prospective professional futures, career orientations (and associated differences in interests, values, attitudes, and abilities), or the professional developmental histories of degree aspirants.

A monolithic conceptualization of Ph.D. preparation clearly tends to inhibit flexibility of thought regarding the establishment or revision of programmatic arrangements designed to meet varying disciplinary conditions, demands, and circumstances.[4]

---

[4] It should be noted that the value of research training for the varied career roles open to Ph.D. recipients is not at issue here. The training is basic to Ph.D. preparation. The primary question implicit in this analysis is, of course, whether or not *other* preparation functions might profitably be formally accommodated within the programmatic format of Ph.D. preparation.

TOWARD GREATER PROGAMMATIC STRUCTURE

Attainment of a Ph.D. degree traditionally has represented the culmination of a complex, loosely structured, basically open-ended developmental process; stressing independent work and the development of individualized "programs" of studies, examinations, and research; taking place in contexts which are task-oriented rather than time-oriented and essentially permissive in respect to both the pattern and the pace of student progress.

Stress on independent work and individual effort, especially in connection with the initiation and completion of an independent research project, has given rise to an essentially molecular conceptualization of Ph.D. preparation—a tendency to think of and treat Ph.D. requirements as elements which can (should) only be *programmed* uniquely, by and for each candidate for the degree.

Time considerations in the context of doctoral study characteristically have related to *minimal,* not normative expectations and have thus tended to establish a "floor" on duration (*and* give currency to a theoretically *possible* but actuarially unrealistic conception of time expectations for degree attainment—namely, the ubiquitous "three years of graduate study beyond the bachelor's degree.")

Student progress toward the degree has not been guided by, or expected to conform to any particular pattern or model and, of course, programmatically projected, actuarially and theoretically consistent expectations for the completion of degree requirements have not been generated.

It is clear that if there is to be significant improvement in the general efficiency of Ph.D. preparation, there must be *some* modification in the way in which graduate work leading to the Ph.D. has been conceived, organized, and conducted. For it is reasonable to infer from the findings of this inquiry that a central element in an overall attack on the duration problem must be efforts (which can only be generated within the graduate school) aimed at effecting a transition from what has been termed "unstructured freedom" in doctoral programs (Heard, 1963, p. 35) toward a more definitely programmatic approach to the specification of Ph.D. requirements, including normative, actuarially "reasonable" expectations with respect to a time dimension; from a position of laissez-faire and relative indifference to "process" in graduate education toward recognition of the importance of planning designed to introduce a greater degree of order, system, and certainty than now obtains, into the preparation of Ph.D. students; and from an essentially permissive toward a constructively directive attitude toward regulation of the pattern and the pace of student progress within the preparation system.

The idea of giving greater form and structure to Ph.D. programs (of "regularizing," "normalizing," or "tightening" doctoral preparation) clearly runs counter to traditional attitudes and values in graduate education and may tend to evoke images of Ph.D. preparation being shorn of its most distinctive features (independent intellectual effort, stress on the pursuit of knowledge and scholarly inquiry)—of Ph.D. programs being converted into a "standard" pattern such as the more completely structured curricular and programmatic format characteristic of medical education. To the extent that such perceptions obtain, graduate faculties are not likely to want to consider initiating changes of the type required.[5]

It is, therefore, quite important to emphasize the fact that the broad injunctions outlined above specify only the necessary *direction,* not the degree of change along the designated programmatic, attitudinal, and procedural dimensions. The question of how far it is feasible to go toward structuring and "tightening" Ph.D. programs without losing the distinctive features, or changing the basic character of doctoral work is a proper question for discussion and debate. However, legitimate concern over the question of *how far* (and even occasional failures to distinguish between "order" and "regimentation") should not obscure the fundamental need to give active consideration to the potential value (for the system as well as for degree candidates) of developing a more definitely programmatic approach to doctoral preparation.[6]

---

[5] According to findings reported by Berelson (1960, pp. 87-88), for example, the question of whether or not "doctoral programs should be 'tightened' and regularized, more like the training programs in medical and law schools" was one with respect to which graduate faculty members exhibited the greatest degree of unanimity achieved in the entire survey of attitudes. Fully 80 per cent felt that such a development should *not* take place.

[6] For a critical analysis of the question of "tight" versus "loose" programs see Berelson (1960, pp. 235-239).

The basic requirements for effecting the necessary changes may be stated quite simply as follows:

1) develop at disciplinary and departmental levels distinct patterns of expectations regarding the understandings, knowledge, skills, and competencies which recipients of a Ph.D. degree should be expected to exhibit

2) specify the amounts, types, and combinations of curricular and other forms of experience (e.g., as in teaching, research, clinical practice) which are thought to be central to the development and/or cultivation of the desired attributes

3) incorporate these elements into a programmatic model which reflects the judgment of the appropriate graduate faculties regarding the educationally and professionally optimal sequencing and organization of the relevant experiences and which projects *normal* patterns of progression through (and time schedules for completing) the sequence as programmed and, finally

4) develop and implement a basic strategy for translating programmatically projected expectations into actual patterns of student progress—i.e., for facilitating the movement of students into and through the preparation system "on schedule," with due regard for individual differences. Such a strategy must include as a necessary but not sufficient element

> a) a plan for continued financial support *throughout the projected duration* of the program contingent upon a candidate's meeting clearly defined criteria of satisfactory progress.

Ph.D. programs embodying some or all of the general concepts outlined above are already under way in some institutions and departments. At Tulane University and Johns Hopkins University, for example, special efforts have been made to accelerate Ph.D. preparation within the framework of a "four-year" programmatic model. Of especial interest is a proposed five-year graduate study sequence leading to the doctorate in history at Harvard which, as described by Dean Franklin Ford (1963), places particular emphasis on the regularization of teaching experience ". . . not as a chore imposed by financial need but as an invaluable part of [the student's] own education." In his exposition of the rationale underlying this program, Dean Ford suggested ". . . that a five-year Ph.D. program, including two years of part-time teaching, will produce more scholar-teachers to meet America's needs than does the present system, or welter of non-systems, and it will produce better ones than would a still more highly accelerated program dedicated to research alone."

From the point of view of the humanities and social sciences, five-year (or even six-year) models [including the concept of regularized and supervised teaching experience and continuing financial support involving a combination of fellowships, remuneration for teaching, and loans, contingent upon satisfactory progress] are more generally consistent with reality than program models calling for less time-expenditure.

In some fields, and in some departments "four-year" models may be quite realistic. All programs must be devised with sufficient flexibility to permit appropriate acceleration in individual cases, and each program must be adapted to departmental circumstances and conditions. In view of the significance of genuinely programmatic efforts, institutional and departmental experiences with all such programs will be watched with keen interest and with a view to assessing the relative merit of various models.

References

American Association of Colleges for Teacher Education, *An Inquiry Into Conditions Affecting Pursuit of the Doctoral Degree in the Field of Education—Vol. I: The Graduates* (Washington, D.C.: The Author, 1960)

Gustave O. Arlt, "The First Ph.D.'s under Title IV," *Journal of Higher Education,* Vol. 34, No. 5, May, 1963, pp. 241-249.

Association of American Universities, *Journal of Proceedings and Addresses of the First and Second Annual Conferences of the Association*—Feb. 27-28, 1900 and Feb. 26-28, 1901, at Chicago (Chicago, Ill.: University of Chicago Press, 1901)

Bernard Berelson, *Graduate Education in the United States* (New York: McGraw-Hill Book Co., Inc., 1960).

Howard R. Bowen, "Graduate Education in Economics," *American Economic Review,* Vol. 43, No. 4, Part 2, September 1953 (Supplement).

Oliver C. Carmichael, *Graduate Education: A Critique and a Program* (New York: Harper and Brothers, 1961).

John L. Chase, *Doctoral Study Fellowships and Capacity of Graduate Schools,* Circular 646, U.S. Office of Education, (Washington D.C.: U.S. Government Printing Office, 1961).

John L. Chase, "The Numbers Game in Graduate Education," *Journal of Higher Education,* Vol. 35, March 1964, pp. 138-143.

John A. Creager, "A Study of Graduate Fellowship Applicants in Terms of Ph.D. Attainment," *Technical Report No. 18,* Office of Scientific Personnel, (Washington, D.C.: NAS-NRC, March 22, 1961).

James A. Davis, Stipends and Spouses: *The Finances of American Arts and Sciences Graduate Students* (Chicago: University of Chicago Press, 1962).

Marcia Edwards, *Studies in American Graduate Education* (New York: Carnegie Foundation for the Advancement of Teaching, 1944).

J. P. Elder, *A Criticism of the Graduate School of Arts and Sciences in Harvard University and Radcliffe College* (Cambridge, Mass: Harvard University, 1958).

Franklin L. Ford, "Ph.D.'s and the College—A Quiet Revolution." *Harvard Alumni Bulletin,* October 26, 1963, pp. 112-114.

David Gottlieb, "American Graduate Students: Some Characteristics of Aspiring Teachers and Researchers," *Journal of Educational Psychology,* Vol. 52, No. 5, February, 1961, pp. 236-240.

George L. Gropper and Robert Fitzpatrick, *Who Goes to Graduate School?* (Pittsburgh, Pa.: American Institute for Research, 1959).

Lindsey R. Harmon, "The Effect of Fellowships on Acceleration of Ph.D. Attainment," *Technical Report No. 14,* Office of Scientific Personnel (Washington, D.C.: NAS-NRC, January 15, 1959).

Ralph E. Iffert, Letter to Editors of the *Harvard Educational Review,* Vol. 34, Fall, 1964, pp. 586-587.

Alexander Heard, *The Lost Years in Graduate Education* (Atlanta, Ga.: Southern Regional Education Board, 1963).

E. Lowell Kelly and Donald W. Fiske, *The Prediction of Performance in Clinical Psychology* (Ann Arbor, Mich.: The University of Michigan Press, 1951).

Hayward Keniston, *Graduate Study and Research in the Arts and Sciences at the University of Pennsylvania* (Philadelphia: University of Pennsylvania Press, 1959).

John C. Metcalf, *Journal of Proceedings and Addresses of the 33rd Annual Conference of the American Association of Universities,* 1931.

National Academy of Sciences—National Research Council, *The Baccalaureate Origins of the Science Doctorates Awarded in the United States, 1936-1945* (Washington, D.C.: The Author, 1948).

National Academy of Sciences—National Research Council, *Baccalaureate Origins of Science Doctorates Awarded in the United States, 1936-1950,* Publication No. 382, (Washington, D.C.: The Author, 1955).

National Academy of Sciences—National Research Council, *Baccalaureate Origins of Doctorates in the Arts, Humanities and Social Sciences Awarded in the United States,* 1936-1950, Publication No. 460, (Washington, D.C.: The Author, 1956).

National Academy of Sciences—National Research Council, *Doctorate Production in United States Universities, 1920-1962, Publication No. 1142* (Washington, D.C.: The Author, 1963).

National Science Foundation, *Two Years After the College Degree—Work and Further Study Patterns,* NSF Publication 63-26 (Washington, D.C.: U.S. Government Printing Office, 1963).

Dexter Perkins and John L. Snell, *The Education of Historians in the United States* (New York: McGraw-Hill Book Co., Inc., 1962).

Sidney L. Pressey, "Some Data on the Doctorate," *Journal of Higher Education,* Vol. 15, April, 1944, pp. 191-193.

Sidney L. Pressey, *Educational Acceleration: Appraisals and Basic Problems* (Columbus, Ohio: Bureau of Educational Research, Ohio State University, 1949).

Sidney L. Pressey, "Age and the Doctorate—Then and Now," *Journal of Higher Education,* Vol. 33, March, 1962, pp. 153-160.

Moody E. Prior, "A Manifesto on Graduate Education," *The Journal of Higher Education,* Vol. 33, No. 5, May 1962, pp. 283-287.

Hans Rosenhaupt with the assistance of Robert Chinlund, *Graduate Students—Experience at Columbia University, 1940-1956* (New York: Columbia University Press, 1958).

Henry Weitz, Robert H. Ballantyne and Robert M. Colver, "Foreign Language Fluency—The Ornament of a Scholar," *Journal of Higher Education,* Vol. 34, No. 8, November, 1963, pp. 443-449.

Dael Wolfle, "Delayed Independence," *Science,* Vol. 143, January 10, 1964 (Editorial).

APPENDIXES

Appendix A

THE QUESTIONNAIRE AND SELECTED CHARACTERISTICS OF THE STUDY SAMPLE

EXHIBIT A.1—THE QUESTIONNAIRE TO GRADUATES

1. Name in full: ________________________________
Last First Middle (Maiden)

2. Current address: ________________________________
Number Street City Zone State

3. Doctoral Institution: ________________________________

4. Type of doctorate: ____________ Ph.D. ____________
(specify)

4a. Conferred ________ ________
month year

5. Doctoral field(s) of specialization: Major ________________
Minor(s) ________________

6. Schools attended and degrees: list below in chronological order **all** collegiate and graduate institutions you have attended, beginning with the first and ending with the one from which you received your Doctorate:

Institution and Location	Dates of Attendance				Major field	Minor field	Degree (if any)	Month and year granted
	From		To					
	Month	Year	Month	Year				

6a. In the appropriate spaces below, considering your entire career as a graduate student, write in the number of **quarters** and/or **semesters,** and the number of **summer sessions** during which you were in attendance at a graduate institution. In differentiating "full-time" and "part-time" attendance, consider a quarter, semester, or summer session as "full-time" if during the term your graduate program constituted your **primary** responsibility.

Periods of Attendance	Total number of terms in attendance (full-or part-time)	Number of periods in attendance (full-time)	Number of periods in attendance (part-time)
Semesters (regular academic year)			
Quarters (regular academic year)			
Summer Sessions			

Clarifying Comments ________________________________

6b. How many of the **total number** of terms of graduate attendance indicated in 6a. were completed at your **doctoral institution?**

________ All (or) ________ quarters ________ semesters ________ summer sessions

6c. How many of the **total number** of terms of graduate attendance indicated in 6a. were completed **prior to** the term during which you completed your **preliminary or qualifying examinations?**

________ quarters ________ semesters ________ summer sessions

6d. How many of the **total number** of terms of graduate attendance indicated in 6a. were completed **prior to** the time of **formal approval of your dissertation topic or subject?**

________ quarters ________ semesters ________ summer sessions

7. Considering only the period between the time you received your bachelor's degree and the time you received your doctorate degree, indicate the number of years of employment (full-time or full-time equivalent) in each of the categories listed below. **Note:** Do not include time devoted to **graduate appointments.**

	Number of years (to nearest year)
College teaching and/or administration	________
Other teaching and/or school administration (e.g., secondary school)	________
Other professional employment	________
Military service	________
Nonprofessional employment	________
Total Years of Employment	________

Clarifying comments ____

____

FACTORS RELATED TO THE PURSUIT OF GRADUATE STUDY

8a. In column "8a" of the table below, check (√) the period during which the **pursuit of graduate study** became a definite personal goal.

8b. In column "8b" of the table below, check (√) the period during which **working toward a doctorate degree** became a definite personal goal.

8c. In column "8c" of the table below, check (√) the period during which you **first became interested in the field** which subsequently became your major field for the doctorate. **Note: Double-check (√√) if you majored in this field as an undergraduate.**

Period	8 a	8 b	8 c
During high school	________	________	________
During college freshman year	________	________	________
During college sophomore year	________	________	________
During college junior year	________	________	________
During college senior year	________	________	________
During a post-bachelor's period of employment or military service, prior to any graduate study	________	________	________
During the first year of graduate study	________	________	________
During a period of employment or military service after some graduate study had been completed			
Other ________ (Specify when)	________	________	________

9. Did you begin your graduate work within **six** months after receiving the bachelor's degree?

______ Yes ______ No

9a. If "No" which of the following factors contributed to **delayed entrance into graduate study?** Check (√) all items applicable in your case; double-check (√√) the factor which contributed **most** to delayed entrance:

______ General uncertainty regarding career goals
______ Desire for "practical experience" before beginning graduate work
______ Inability to finance adequately a desired program of graduate study
______ Period of military service
______ Uncertainty regarding a graduate field of specialization
______ Career plans at the time did not include graduate study
______ Advice or recommendation of others______________________
Specify (e.g., undergraduate adviser)
______ Health problems
______ Family obligations
______ Other______________________________

10. After earning a master's degree did you proceed, within **six months**, into the doctoral phase of your graduate study?

______ Yes ______ No
______ Not applicable; **did not take a master's degree**

10a. If "No", indicate which of the following factors contributed to **delayed entrance into a doctoral sequence or program.** Check (√) all items applicable in your case; double-check (√√) the factor which contributed most to delayed entrance:

______ Uncertainty regarding a doctoral field of specialization
______ Uncertainty regarding choice of doctoral institution
______ Inability to finance further graduate study at the time
______ Period of military service
______ At the time, master's degree was considered terminal; had not thought seriously of working toward a doctorate
______ Advice or recommendation of others______________________
Specify
______ Lack of satisfaction with master's program
______ Health problems
______ Family obligations
______ Other______________________________

11. Between the time you began your graduate work and the time you completed **course and residence** requirements for the doctorate, were you essentially continuously in attendance (whether or not at the same institution) as a graduate student?

Check (√) appropriate response.

______ Yes (Check here if, exclusive of summer sessions of nonattendance, you were continuously in attendance as a graduate student).

______ No (Check here if, exclusive of summer sessions of nonattendance, your attendance as a graduate student was **interrupted** one or more times—e.g., by a period of full-time employment).

11a. If your answer to item 11 is "No", briefly describe below the factors or circumstances which were associated with discontinuity of graduate attendance.

____

____

____

____

____

____

FINANCING GRADUATE STUDY

12. Rate each of the sources below in terms of the **importance of its contribution to financing your graduate study** (a) during the master's phase (or, if you did not take a master's degree, during the first year of graduate study) and (b) during the post-master's phase (or, during the second and subsequent years of study).

Indicate your rating of the importance of each source by **encircling the appropriate number** in the columns below according to the following code:

1 = Source of major importance
2 = Source of moderate importance
3 = Source of slight importance
4 = Received **no** support from this source

Rating of importance during master's phase (or first year of graduate study)				**Source**	Rating of importance during post-master's phase (or after first year of study)			
1	2	3	4	Personal savings	1	2	3	4
1	2	3	4	Independent income (e.g., from investments)	1	2	3	4
1	2	3	4	Educational trust fund	1	2	3	4
1	2	3	4	Employment not related to graduate program	1	2	3	4
1	2	3	4	Research assistantship(s)	1	2	3	4
1	2	3	4	Teaching assistantship(s)	1	2	3	4
1	2	3	4	Graduate appointments other than research or teaching assistantships	1	2	3	4
1	2	3	4	Fellowship grant(s) not calling for specified duties (outright grants)	1	2	3	4
1	2	3	4	Earnings of spouse	1	2	3	4
1	2	3	4	University loan funds	1	2	3	4
1	2	3	4	Loan(s) from agency or person outside university	1	2	3	4
1	2	3	4	Direct assistance from family	1	2	3	4
1	2	3	4	Veteran's benefits	1	2	3	4
1	2	3	4	Other______________	1	2	3	4

12a. If you received "Veteran's benefits" indicate the number of months of eligibility or entitlement you actually **applied to your graduate program.**

(1) Benefits under
P. L. 346
(G. I. Bill) ________
months

(2) Benefits under
P. L. 16
(Rehabilitation Act) ________
months

(3) Benefits under
P. L. 894
(Korean service) ________
months

(4) Benefits under
P. L. 550
(Korean service) ________
months

12b. If you received fellowship grants not calling for specific duties, please supply the following information:

(1) Number of such grants received ________
Number

(2) Total amount of all grants received $________
Amount

(3) Grant(s) used to finance (check all applicable items)
________dissertation research
________a period of resident graduate study
________Other ________________________________
Specify
____

12c. If you held a teaching assistantship, research assistantship, or other graduate appointment calling for specified duties, please supply the following information:

Type of appointment	Total number of terms employed in such appointments			Number of terms employed **more than one-half time**		
	Summer Sessions	During academic year (Quarters)	(Semesters)	Summer Sessions	During academic year (Quarters)	(Semesters)
(1) Research Assistantship						
(2) Teaching Assistantship						
(3) ________ (Specify other types)						

12d. What was the total amount of all stipends received from such employment? Estimate total, including indirect methods of payment (e.g., remission of tuition).

(1) Total amount of stipends from graduate appointments $________
Amount
(Exclude yourself)

13. Number of dependents **at time graduate study was begun** ________
Number

13a. Number of dependents at time **doctoral phase of your graduate program was begun** ________
Number

13b. Number of dependents at time **doctorate degree was conferred** ________
Number

THE LANGUAGE REQUIREMENT

14. In the spaces below, indicate formal preparation in foreign languages prior to beginning graduate study (columns A and B), language(s) presented in fulfillment of the doctoral language requirement (column C). Check opposite **doctoral** language(s) (in column D) if special and/or additional preparation was required **after** beginning graduate study in order to meet the **doctoral requirement** in the language(s).

Language	(A) Years studied in high school	(B) Years Studied as undergraduate	(C) Presented as doctoral language (√)	(D) Special preparation required (√)
French	________	________	________	________
German	________	________	________	________
Spanish	________	________	________	________
Other________ specify	________	________	________	________
Other________ specify	________	________	________	________

THE DISSERTATION REQUIREMENT

15. How many months elapsed between the time your dissertation topic was formally approved and the time you submitted the dissertation in essentially final form?

Number of months____________

15a. **Within the period encompassed in item 15,** during how many months were you

(1) engaged in full time employment? ____________ Number of months

(2) in residence? ____________ Number of months

(3) ____________ Specify other ____________ Number of months

16. By the time you had completed formal residence and course requirements for the doctorate, how much progress had you made toward completion of the **dissertation requirement?** Check the item which is **most** descriptive in your case. If you feel that the item checked is not **sufficiently** descriptive, in the spaces provided briefly describe your stage of progress.

________Dissertation had been completed
________Basic research and/or analysis had been completed but some or all writing remained to be done
________All or essentially all basic data or source material had been collected but not completely analyzed
________Had definite (and formally approved) plans for the dissertation and some basic data had been collected
________A dissertation proposal had been submitted but had not yet been formally approved
________Had not yet decided upon a dissertation topic

Note: If the alternative you checked above is not sufficiently descriptive, briefly describe your stage of progress in the spaces below:

____
____
____
____
____

17. If you were employed as a **research assistant** during the advanced stages of your graduate program, was the work in which you engaged related to your dissertation research?

________Work done was applied directly to my dissertation
________Work done was **related** to my dissertation topic but could not be **directly** applied to the dissertation
________Work done was relatively unrelated to the dissertation
________Other: If none of the above is sufficiently descriptive, please outline briefly the relationship between your work as a research assistant and your dissertation research.

____
____
____
____

18. To what extent was the amount of time it took you to get a doctorate affected by each of the following factors? Rate each factor according to the following code:

1 = Lengthened time considerably
2 = Lengthened time somewhat
3 = Did not lengthen time
4 = The conditions or circumstances implied by this item were **not present** in my case

Factor	Encircle appropriate code number			
a. Lack of coordination between beginning and advanced stages of graduate work	1	2	3	4
b. Discontinuity of graduate attendance	1	2	3	4
c. Inadequate undergraduate preparation in graduate field of specialization	1	2	3	4
d. Transferring from one graduate institution to another	1	2	3	4
e. Change(s) in field of specialization during graduate study	1	2	3	4
f. Inadequate preparation in foreign languages prior to beginning graduate work	1	2	3	4
g. Change(s) in dissertation topic after some work already completed	1	2	3	4
h. Changes in membership of dissertation committee	1	2	3	4
i. Writing dissertation off-campus while engaged in full-time employment	1	2	3	4
j. Nature of the dissertation subject, per se	1	2	3	4
k. Work as a research assistant	1	2	3	4
l. Work as a teaching assistant	1	2	3	4
m. Family obligations	1	2	3	4
n. Financial problems	1	2	3	4
o. Health problems	1	2	3	4

18a. Which one of the foregoing factors was **most important in increasing** the amount of time required to earn the doctorate? Indicate by checking (√) your response to this factor in item 18.

18b. Indicate here other factors, if any, which you consider to be more pertinent in your case than any of those listed in item 18.

____

____

____

19. Considering your expectations at the time you **initiated the doctoral phase of your graduate work,** which one of the following is **most** applicable in your case?

________Time taken to get the doctorate was much greater than anticipated

________Time taken to get the doctorate was somewhat greater than anticipated

________Time taken to get the doctorate was approximately as expected

________Time taken to get the doctorate was somewhat less than anticipated

________Time taken to get the doctorate was much less than anticipated

________Had no definite expectations regarding completion of requirements for the doctorate within a given period of time

20. In view of your own experience, and your observation of the experience of others engaged in graduate study, what do you think could be done to reduce the amount of time taken to earn the doctorate degree in your field **within the framework of existing requirements and without reducing the "quality" of the degree? Note: If additional space is needed use back of page.**

---

21. Title of current position ____________________

22. Organization or institution ____________________
(name of organization)
Principal duties ____________________

23. Date of birth: ________ ________
month year

24. Place of birth: ____________________
state

25. If married, year of marriage: ________
year

26. Year graduated from high school: ________
year

27. Father's occupation: ____________________

28. Father's education: ____________________
(Highest grade or degree)

29. Mother's education: ____________________
(Highest grade or degree)

30. Were you in military service? ______ Yes ______ No
From ______ to ______ From ______ to ______
year year year year

Exhibit A.2

The Sample, By Institution and By Field: Total Number of Graduates (1950-1958) in Fields Selected for Study, Questionnaires Distributed, Number Returned and Per Cent Returned, Respectively

Institution and Field	Number of graduates (1950-58)	No. questionnaires distributed	Number of returns	Per cent returned
Texas, University of	(410)	(194)	(152)	(78.4)
Botany	7	7	6	85.7
Microbiology	43	39	28	71.8
Zoology	60	12 (20%)	10	83.3
Physiology	5	5	5	100.0
Mathematics	37	33	26	78.8
Chemistry	193	39 (20%)	33	84.6
Sociology	11	10	10	100.0
Political Science	27	26	18	69.2
Foreign Languages	27	23	16	69.6
University of Maryland	(201)	(198)	(150)	(75.8)
Botany	35	39	33	84.6
Microbiology	39	35	29	82.8
Mathematics	20	20	11	55.0
Physics	47	47	36	76.6
Psychology	38	38	32	84.2
Political Science	6	5	0	0.0
English	16	14	9	64.3
University of Kentucky	(166)	(163)	(141)	(87.1)
Microbiology	8	8	8	100.0
Mathematics	15	15	13	86.7
Chemistry	27	24	20	83.3
Engineering	5	5	5	100.0
Psychology	57	57	46	80.7
Sociology	8	8	7	87.5
Economics	12	12	11	91.7
History	18	18	18	100.0
English	16	16	13	81.2

Exhibit A.2 (Continued)

The Sample, By Institution and By Field: Total Number of Graduates (1950-1958) in Fields Selected for Study, Questionnaires Distributed, Number Returned and Per Cent Returned, Respectively

Institution and Field	Number of graduates (1950-58)	No. questionnaires distributed	Number of returns	Per cent returned
Vanderbilt University	(255)	(255)	(137)	(53.7)
Microbiology	8	8	6	75.0
General Biology	17	17	11	64.7
Physiology	4	4	1	25.0
Mathematics	5	5	3	60.0
Physics	28	28	17	60.7
Chemistry	55	55	22	40.0
Psychology	34	34	14	41.2
Sociology	10	10	5	50.0
Political Science	1	1	1	100.0
Economics	10	10	5	50.0
History	28	28	15	53.6
English	55	55	37	67.3
Univ. of North Carolina	(166)	(166)	(134)	(80.7)
Botany	11	11	8	72.7
Physiology	6	6	5	83.3
Sociology	49	49	39	79.6
Political Science	20	20	17	85.0
Foreign Language	80	80	65	81.2
Duke University	(255)	(185)	(133)	(71.9)
Botany	26	26	23	88.5
Microbiology	13	13	8	61.5
Physiology	16	8 (50%)	7	87.5
Mathematics	20	20	14	70.0
Physics	77	15 (20%)	11	73.3
Psychology	18	18	9	50.0
Sociology	16	16	10	62.5
Political Science	28	28	22	78.6
History	41	41	29	70.7

Exhibit A.2 (Continued)

The Sample, By Institution and By Field: Total Number of Graduates (1950-1958) in Fields Selected for Study, Questionnaires Distributed, Number Returned and Per Cent Returned, Respectively

Institution and Field	Number of graduates (1950-58)	No. questionnaires distributed	Number of returns	Per cent returned
Louisiana State Univ.	(215)	(215)	(130)	(60.5)
Botany	33	33	19	57.6
Microbiology	9	9	5	55.6
Zoology	16	16	9	56.2
Physics	18	18	9	50.0
Chemistry	51	51	27	52.9
Engineering	13	13	9	69.2
Psychology	11	11	7	63.6
Sociology	23	23	18	78.3
Economics	9	9	6	66.7
History	14	14	10	71.4
English	18	18	11	61.1
Univ. of Tennessee	(174)	(172)	(126)	(73.2)
Zoology	12	12	8	75.0
Physics	31	30	22	73.3
Chemistry	64	63	47	74.6
Engineering	16	16	11	68.8
Psychology	51	51	38	74.5
University of Florida	(151)	(151)	(123)	(81.4)
Biology, general	32	32	27	84.4
Chemistry	80	80	62	77.5
Engineering	14	14	14	100.0
Economics	11	11	8	72.7
History	14	14	12	85.7
University of Virginia	(180)	(173)	(118)	(68.2)
Biology, general	26	26	18	69.2
Chemistry	74	68	46	67.6
Political Science	10	10	8	80.0
Economics	27	27	17	62.9
History	34	34	26	76.5
Foreign Languages	9	8	3	37.5

Exhibit A.2 (Continued)

The Sample, By Institution and By Field: Total Number of Graduates (1950-1958) in Fields Selected for Study, Questionnaires Distributed, Number Returned and Per Cent Returned, Respectively

Institution and Field	Number of graduates (1950-58)	No. questionnaires distributed	Number of returns	Per cent returned
University of Delaware	(168)	(168)	(91)	(54.2)
Microbiology	1	1	1	100.0
Zoology	1	1	1	100.0
Chemistry	125	125	62	49.6
Engineering	41	41	27	65.8
Florida State Univ.	(100)	(100)	(75)	(75.0)
Zoology	6	6	4	66.7
Mathematics	3	3	2	66.7
Physics	2	2	1	50.0
Chemistry	31	31	24	77.4
Psychology	32	32	25	78.1
Sociology	15	15	12	80.0
Foreign Languages	5	5	3	60.0
English	6	6	4	66.7
North Carolina State	(88)	(78)	(67)	(85.9)
Botany	8	8	7	87.5
Mathematics	41	35	33	94.3
Engineering	26	23	17	73.9
Economics	13	12	10	83.3
Texas A & M	(65)	(65)	(57)	(87.7)
Zoology	7	7	7	100.0
Physics	11	11	11	100.0
Chemistry	18	18	14	77.8
Engineering	29	29	25	86.2
Oklahoma, Univ. of	(116)	(116)	(56)	(48.3)
Zoology	18	18	7	38.9
Mathematics	11	11	7	63.6
Physics	21	21	12	57.1
Psychology	29	29	14	48.3
History	16	16	9	56.2
English	21	21	7	33.3

Exhibit A.2 (Concluded)

The Sample, By Institution and By Field: Total Number of Graduates (1950-1958) in Fields Selected for Study, Questionnaires Distributed, Number Returned and Per Cent Returned, Respectively

Institution and Field	Number of graduates (1950-58)	No. questionnaires distributed	Number of returns	Per cent returned
Virginia Poly. Institute	(59)	(59)	(50)	(84.7)
Zoology	2	2	1	50.0
Mathematics	15	15	15	100.0
Chemistry	12	12	10	83.3
Engineering	30	30	24	80.0
West Virginia Univ.	(46)	(46)	(42)	(91.3)
Chemistry	19	19	16	84.2
Engineering	19	19	19	100.0
History	8	8	7	87.5
Oklahoma State Univ.	(63)	(61)	(36)	(59.0)
Zoology	23	23	11	45.8
Chemistry	30	28	18	64.3
English	10	10	7	70.0
George Peabody College	(55)	(53)	(38)	(71.7)
Mathematics	14	14	10	71.4
Psychology	13	12	8	66.7
History	15	15	12	80.0
English	13	12	8	66.7
Ga. Inst. Technology	(53)	(53)	(35)	(66.0)
Chemistry	19	19	13	68.4
Engineering	34	34	22	64.7
University of Arkansas	(25)	(24)	(24)	(100.0)
Chemistry	18	18	18	100.0
English	7	6	6	100.0
Texas Tech. College	(13)	(13)	(13)	(100.0)
Chemistry	2	2	2	100.0
Psychology	1	1	1	100.0
History	5	5	5	100.0
English	5	5	5	100.0

Exhibit A.3

Composition of the Sample, By Field and By Institution, As Classified for Purposes of Analysis and Total Response Rate for Each Institution

Institution	Percent Return	Bot.	Micr.	Zool.	Biol. Misc.*	Math.	Phys.	Chem.	Engi.	Psy.	Soc.	Pol. Sci.	Econ.	Hist.	Lang.	Engl.	Total
Texas	(78.4)	6	28	10	10	26	—	27	—	—	10	18	—	—	16	1	152
Maryland	(75.8)	33	29	—	—	11	36	—	—	32	—	—	—	—	—	9	150
Kentucky	(87.1)	—	8	—	1	13	—	20	5	46	7	—	11	18	—	13	142
Vanderbilt	(54.6)	5	6	6	2	3	17	21	—	14	5	1	5	15	—	37	137
North Carolina	(81.2)	8	—	—	5	—	—	—	—	—	39	17	—	—	64	1	134
Duke	(71.9)	23	8	—	7	14	11	—	—	9	10	22	—	29	—	—	133
L. S. U.	(60.5)	19	5	9	3	—	9	24	9	7	18	—	6	10	—	11	130
Tennessee	(73.2)	—	—	8	—	—	22	47	11	38	—	—	—	—	—	—	126
Florida	(81.4)	—	—	—	30	—	—	59	14	—	—	—	8	12	—	—	123
Virginia	(68.2)	—	—	—	18	—	—	46	—	—	—	8	17	26	3	—	118
Delaware	(54.2)	—	1	1	1	—	—	61	27	—	—	—	—	—	—	—	91
F. S. U.	(75.0)	—	—	4	3	2	1	21	—	25	12	—	—	—	3	4	75
N. C. State	(85.9)	7	—	3	—	30	5	—	12	—	—	—	10	—	—	—	67
Texas A & M	(87.7)	—	—	7	—	—	11	14	25	—	—	—	—	—	—	—	57
Oklahoma	(48.3)	—	—	7	—	7	12	—	—	14	—	—	—	9	—	7	56
V. P. I.	(84.7)	—	—	1	—	15	—	10	24	—	—	—	—	—	—	—	50
W. Virginia	(91.3)	—	—	—	—	—	—	16	19	—	—	—	—	7	—	—	42
Peabody	(71.7)	—	—	—	—	10	—	—	—	8	—	—	—	12	—	8	38
Oklahoma State	(59.0)	—	—	11	1	—	—	17	7	—	—	—	—	—	—	—	36
Georgia Tech	(66.0)	—	—	—	—	—	—	13	22	—	—	—	—	—	—	—	35
Arkansas	(100.0)	—	—	—	1	—	—	17	—	—	—	—	—	—	—	6	24
Texas Tech	(100.0)	—	—	—	1	—	—	1	—	1	—	—	—	5	—	5	13
All Institutions	(71.2)	101	85	67	83	131	124	414	175	194	101	66	57	143	86	102	1929

Note: Institutions distributed questionnaires to graduates in selected fields. "Per cent return" based on the total number of questionnaires distributed. Emory University (not listed) administered a preliminary form of the questionnaire to graduates in chemistry and history.

* Biosciences, Misc. includes Biology, general; Biochemistry; and Physiology.

Exhibit A.4

Sex of Respondents, by Field

Field	(N)	Male		Female		
		Number	Per cent	Number	Per cent	
Biosciences	336	319	95.0	17	5.0	—
Botany	101	95	94.1	6	5.9	(10.6)*
Microbiology	85	79	93.0	6	7.0	(12.7)
Zoology	67	67	100.0	0	0.0	(10.1)
Other Biosciences	83	78	94.0	5	6.0	(6.2)
Phys. Sciences	844	830	98.4	14	1.6	—
Mathematics	131	127	97.0	4	3.0	(4.8)
Physics	124	123	99.2	1	0.8	(1.9)
Chemistry	414	405	97.8	9	2.2	(4.3)
Engineering	175	175	100.0	0	0.0	(0.2)
Social Sciences	418	389	93.1	29	6.9	—
Psychology	194	183	94.3	11	5.7	(12.7)
Sociology	101	87	86.1	14	13.9	(13.3)
Pol. Sci.	66	62	93.9	4	6.1	(5.9)
Economics	57	57	100.0	0	0.0	(4.6)
Humanities	331	277	83.7	54	16.3	—
History	143	132	92.3	11	7.7	(9.0)
Languages	86	68	79.1	18	20.9	(21.4)
English	102	77	75.5	25	24.5	(18.0)
All Fields	1929	1815	94.1	114	5.9	—

*Numbers in parentheses indicate percentage of women, nationally, receiving the Ph.D. in each field during the period 1950-1954 (NAS-NRC, 1963).

Exhibit A.5

Distribution of Respondents According to General Type and Location of Employing Institution or Agency, By Field (In Per Cent)

Field	(N)	Employed by college or university		Other type of employer		All types of employers	
		South*	Non-South	South*	Non-South	South*	Non-South
Biosciences	336	40.5	25.0	22.3	12.2	62.8	37.2
Botany	101	35.6	27.7	31.7	5.0	67.3	32.7
Microbiology	85	29.4	27.1	22.4	21.1	51.8	48.2
Zoology	67	47.8	22.4	16.4	13.4	64.2	35.8
Other	83	51.8	21.7	15.7	10.8	67.5	32.5
Physical Sciences	844	21.1	12.1	37.2	29.6	58.3	41.7
Mathematics	131	41.2	27.5	17.6	13.7	58.8	41.2
Physics	124	21.0	17.7	33.9	27.4	54.9	45.1
Chemistry	414	16.2	7.5	41.0	35.3	57.2	42.8
Engineering	175	17.7	7.4	45.2	29.7	62.9	37.1
Social Sciences	418	41.2	16.7	28.2	13.9	69.4	30.6
Psychology	194	19.1	8.2	47.9	24.8	67.0	33.0
Sociology	101	58.4	24.8	13.9	2.9	72.3	27.7
Political Sci.	66	60.6	33.3	—	6.1	60.6	39.4
Economics	57	63.1	12.3	19.3	5.3	82.4	17.6
Humanities	331	63.7	26.6	7.5	2.1	71.3	28.7
History	143	60.1	28.7	8.4	2.8	68.5	31.5
Language	86	64.0	27.9	8.1	—	72.1	27.9
English	102	68.6	22.6	5.9	2.9	74.5	25.5
All Fields	1929	36.1	17.8	27.6	18.5	63.7	36.3

*Sixteen SREB compact states.

APPENDIX B

COMPARATIVE DATA ON BA-PHD TIME LAPSE FOR SELECTED FIELDS, PERIODS, AND GROUPS

Exhibit B.1

Comparison of Bachelor's-to-Doctorate Time Lapse Percentiles, by Field, for all Southern Region Graduates, 1950-1956, and for Graduates in the Study Sample, 1950-1958

Field*	Bachelor's to doctorate time lapse (in years)									
	All Southern region (1950-56)**					Study sample (1950-58)				
	(N)	P_{25}	P_{50}	P_{75}	Mean	(N)	P_{25}	P_{50}	P_{75}	Mean
Botany	(144)	5.2	7.6	10.4	8.7	(96)	5.1	7.2	10.5	8.8
Micro.	(125)	4.8	6.4	10.8	8.4	(80)	5.2	6.8	10.0	8.2
Zoology	(234)	5.0	7.9	11.6	8.9	(67)	5.6	8.1	10.4	9.1
Math.	(247)	5.6	8.8	13.2	10.1	(124)	5.8	8.9	14.0	10.4
Physics	(433)	4.8	6.9	10.0	8.1	(122)	5.8	7.6	10.6	8.6
Chem.	(1046)	4.4	5.8	8.6	7.1	(398)	4.5	6.0	8.5	7.2
Engin.	(362)	5.4	7.9	11.4	8.9	(171)	4.7	6.6	9.7	7.8
Psych.	(466)	4.8	6.0	9.0	7.8	(190)	5.2	6.4	8.5	7.4
Socio.	(123)	6.2	9.7	15.2	11.2	(95)	6.3	8.9	13.4	10.8
Pol. Sci.	(109)	5.8	8.0	12.3	9.8	(63)	6.8	9.8	13.0	10.9
Econ.	(204)	6.0	9.6	13.7	10.5	(55)	7.0	9.9	15.1	11.3
History	(336)	6.6	10.0	15.2	11.4	(142)	7.0	9.9	15.9	11.8
Lang.	(165)	6.3	11.3	14.9	12.1	(81)	7.8	11.1	16.2	12.6
English	(355)	6.8	11.8	17.9	13.0	(99)	8.2	12.6	18.1	14.1

*Data for the category, "Other Biosciences," are not included here.

**These data based on special tabulations provided by the National Research Council. Essentially all doctoral graduates in the designated fields for the period under consideration were represented in these tabulations.

Exhibit B.2

BA-PHD Time Lapse Data for the Nation and for the Southern Region, Selected Periods and Fields

Field	Period	Time-Lapse Percentiles P_{25}	P_{50}	P_{75}	Field	Period	Time-Lapse Percentiles P_{25}	P_{50}	P_{75}
All Sciences					Economics				
U. S.	1936-45*	3.5	5.2	8.1	U. S.	1936-40	6.2	9.3	13.9
U. S.	1946-50*	5.1	7.1	9.5	U. S.	1946-50	7.7	10.5	14.2
SREB	1950-56**	4.8	6.8	10.4	SREB	1950-56	6.0	9.6	13.7
SREB	1950-58#	5.1	6.8	9.9	SREB	1950-58	7.0	9.9	15.1
Psychology					History				
U. S.	1936-40	4.6	6.6	11.2	U. S.	1936-40	6.3	9.8	14.3
U. S.	1946-50	5.7	8.4	11.5	U. S.	1946-50	8.0	10.6	14.6
SREB	1950-56	4.8	6.0	9.0	SREB	1950-56	6.6	10.0	15.2
SREB	1950-58	5.2	6.4	8.5	SREB	1950-58	7.0	9.9	15.9
Sociology					Foreign Languages				
U. S.	1936-40	6.4	9.6	13.5	U. S.	1936-40	6.0	9.3	14.2
U. S.	1946-50	8.5	11.4	15.1	U. S.	1946-50	8.6	12.4	17.3
SREB	1950-56	6.2	9.7	15.2	SREB	1950-56	6.3	11.3	14.9
SREB	1950-58	6.3	8.9	13.4	SREB	1950-58	7.8	11.1	16.2
Political Science					English				
U. S.	1936-40	5.4	8.0	12.3	U. S.	1936-40	7.2	10.5	14.7
U. S.	1946-50	7.1	9.0	12.7	U. S.	1946-50	8.6	11.6	16.2
SREB	1950-56	5.8	8.0	12.3	SREB	1950-56	6.8	11.8	17.9
SREB	1950-58	6.8	9.8	13.0	SREB	1950-58	8.2	12.6	18.2

*U. S. percentiles for sciences from NAS-NRC Publication No. 382 (1955); for other fields from NAS-NRC Publication No. 460 (1956).

**Special tabulation of NRC data for essentially all graduates of institutions located in SREB states.

#Study sample

Exhibit B.3

BA—PHD Time Lapse: Means for the Nation and for the Southern Region, Selected Fields and Periods

Field	All graduates, South, 1950-56[a]			All graduates, United States	Study sample, South,
	"Established" doctoral institutions	"Emergent" doctoral institutions	All graduates	1950-1959[b]	1950-58
Physical Sciences	(8.0)	(7.9)	(8.0)	(7.4)	(8.0)
Mathematics	10.6	8.9	10.1	8.3	10.4
Physics	7.8	10.9	8.1	7.4	8.6
Chemistry	7.1	7.0	7.1	6.6	7.2
Earth Sciences	8.7	*	8.6	8.1	—
Engineering	9.1	8.7	8.9	8.1	7.8
Biosciences	(8.4)	(9.4)	(8.7)	(8.3)	(8.6)
Agriculture	8.2	8.8	8.6	8.6	—
Botany	8.8	8.2	8.7	7.9	8.8
Biochemistry	7.9	7.9	7.9	7.4	—
Genetics	*	10.2	9.4	—	—
Microbiology	8.1	10.0	8.4	8.1	8.2
Physiology	7.1	7.7	7.3	8.1	—
Zoology	8.5	9.9	8.9	8.4	9.1
Miscellaneous	8.6	9.9	9.2	8.2	8.2
Medical Sciences	9.0	*	9.1	10.1	—
Social Sciences	(9.9)	(9.1)	(9.8)	(10.0)	(9.3)
Sociology	11.1	11.8	11.2	11.3	10.8
Economics	10.6	10.1	10.5	10.5	—
Geography	10.5	*	11.2	12.0	—
History	11.5	10.8	11.4	11.1	11.8
Political Science	9.9	*	9.8	10.5	10.9
Psychology	7.7	7.9	7.8	8.5	7.4
Arts and Humanities	(12.3)	(13.0)	(12.4)	—	—
Business	12.7	*	11.9	11.7	—
Foreign Languages	11.6	15.4	12.1	12.0	12.6
English	12.9	14.0	13.0	12.0	14.1
Arts and Music	13.6	13.7	13.7	—	—
Philosophy	7.4	—	7.4	10.0	—
Religion	11.1	—	11.1	12.5	—
Speech	15.4	*	14.3	14.2	—
Other	9.9	12.4	11.0	12.1	—
Education	(15.0)	(15.8)	(15.2)	(15.2)	—

---

[a] Based on special tabulations of data by the National Research Council, Office of Scientific Personnel for all graduates of Southern institutions. "Established" institutions are those which granted more than 50 doctorates, 1936-1950; "emergent" institutions are those which granted fewer than 50 doctorates, 1936-1950. Asterisk means less than 10 cases.

[b] *Doctorate Production in United States Universities, 1920-1962* (NAS-NRC, 1963, pp. 20-21).

APPENDIX C

TABULAR SUMMARY OF MAJOR FINDINGS

TABLE C-1

Data Descriptive of the Course, Duration and Selected Concomitants of Doctoral Preparation: A Summary of Findings By Broad Academic Area

Variable	Phys sci	Bio sci	Soc sci	Humanities
Time taken to attain the doctorate				
BA-PHD time lapse, median years	6.7*	7.2	7.7*	11.2
Interquartile range (in years)**	5.0*	4.6	5.2*	9.5
Entry-PHD time lapse, median years	5.4*	5.8	6.4*	9.0
Interquartile range (in years)**	3.9*	3.8	4.5*	7.5
MA-PHD time lapse, median years	3.8*	4.1	4.6*	6.7
Graduate attendance, total (mdn., calendar yr. equiv.)	4.3	4.4	3.8	3.9
Interquartile range (in years)**	1.7	1.7	1.5	1.6
Graduate attendance, doctoral institution only (median)	3.7	3.6	3.1	3.2
Predoctoral employment including military service but exclusive of graduate appointments (% reporting)	72	74	85	91
Predoctoral employment, median in years, f.t.e	2.9*	2.5	3.4*	6.4
Age at time of degree conferral (median yrs.)	29.3*	31.0	31.5*	33.7
Career orientation of graduates				
Predoctoral employment in college teaching (%)	35*	32	44*	70
Predoctoral employment in "other teaching" (%)	8*	12	14	41
Yrs. of predoctoral employment in teaching service as a per cent of total years employed	39*	41	47*	68
Yrs. of predoctoral employment in other professional service as a per cent of total years employed	41*	32	28*	8
Postdoctoral employer was college or university (%)	33*	66	58*	90
Principal duties in postdoctoral employment (%):				
Research and/or research administration	59*	34	19*	2
Teaching *and* research	10*	31	18*	5
Teaching and/or academic administration	19*	25	38*	86
Other duties	12*	10	25*	7
Goal development at time of college graduation				
Definite plans for graduate study (%)	74	72	75	66
Definite interest in the field which became Ph.D. major (%)	83	69	71	73
Earning the Ph.D. degree was a definite personal goal (%)	31*	25*	30*	25*

TABLE C-1, con't.

Data Descriptive of the Course, Duration, and Selected Concomitants of Doctoral Preparation: A Summary of Findings By Broad Academic Area

Variable	Phys sci	Bio sci	Soc sci	Humanities
Continuity of the doctoral preparation process				
Delayed entry into graduate school (%)	33*	33	32*	40
"Discontinuity of graduate attendance" cited as a lengthening influence (% of graduates)	27	25	37	46
One or more interruptions in graduate attendance prior to completing course and residence requirements (%)	29*	31	40*	58
Earned a master's degree (%)	82*	89	87*	95
Interrupted study following conferral of the master's (%)	23*	30	32*	46
Institutional attendance and degree pattern:				
Attended only one graduate school—Ph.D. only (%)	16	10	12*	2
Attended only one graduate school—MA and Ph.D. (%)	43	39*	30	40
Attended two graduate schools—MA at 1st, Ph.D. at 2nd (%)	28	39*	37*	28
Attended two or more graduate schools with some non-degree work at one or more (%)	13*	13	20	29*
"Transferring from one graduate institution to another" cited as lengthening factor (%)	22	22	22	20
"Lack of coordination between beginning and advanced stages of study" cited as lengthening factor (%)	24	19	33	20
"Changes in field during graduate study" cited as lengthening factor (%)	9*	13	16	11
"Completion of the dissertation off-campus during period of full-time employment" cited as a lengthening factor (%)	18*	19	37*	45
Financing Graduate Study				
"Financial problems" cited as a lengthening factor (%)	23	25	32	35
Leading sources of financial support (% rating each source as of "major" importance—advanced period of study):				
Veterans' benefits	18	24	32	31
Teaching assistantships	27	30	20	37
Research assistantships	31	33	20	6
Earnings of spouse	17	20	22	20
Fellowship awards (non-duty stipends)	21	17	13	15
Personal Savings	7	8	11	15

TABLE C-1, con't.

Data Descriptive of the Course, Duration, and Selected Concomitants of Doctoral Preparation: A Summary of Findings By Broad Academic Area

Variable	Phys sci	Bio sci	Soc sci	Humanities
Financing graduate study, con't.				
Per cent reporting a teaching assistantship	69	63	51	67
Mean number of semesters	5.6	5.6	4.0	5.6
Per cent reporting a research assistantship	49	54	44	15
Mean number of semesters	6.1	6.4	4.3	2.9
Per cent holding any type of appointment on more than "a half-time basis"	33	29	28	18
"Work as a research assistant" cited as a factor increasing time taken to get the degree (%)	11	13	12	5
"Work as a teaching assistant" cited as a factor increasing time taken to get the degree (%)	36	36	18	34
Per cent reporting one or more fellowship grants	40	34	36	49
Total value of all grants (mean $'s per recipient)	$3000	3360	1980	1700
Family obligations				
"Family obligations" cited as a factor increasing time taken to get the degree (%)	21	19	25	29
Per cent of graduates reporting 2 or more dependents:				
at beginning of graduate study	15	17	17	14
at beginning of the Ph.D. phase of graduate study	32	39	36	26
at time of degree conferral	51	56	60	44
Meeting the research requirement				
"Nature of the dissertation problem" cited as a lengthening factor (%)	28	34	31	32
"Writing the dissertation off-campus during a period of full-time employment" a lengthening factor (%)	18	19	37	45
"Changes in the dissertation topic after some work already completed" a lengthening factor (%)	16	12	15	12
"Changes in the membership of the dissertation committee" cited as a lengthening factor (%)	4	5	13	7
Median yrs. of graduate attendance before gaining formal approval of a dissertation topic	2.7	2.5	2.8	2.5
Time lapse, topic approval to completion (mean yrs.)	1.9	2.2	1.7*	2.7

TABLE C-1, con't.

Data Descriptive of the Course, Duration, and Selected Concomitants of Doctoral Preparation: A Summary of Findings By Broad Academic Area

Variable	Phys sci	Bio sci	Soc sci	Human-ities
Meeting the research requirement, con't.				
Per cent requiring 3 calendar years or more	14	20	13*	35
Per cent in attendance 2 or more yrs. after topic approved	28	37	4*	15
Per cent employed full-time 2 or more yrs. while completing the dissertation (%)	11	15	16*	30
Work as a research assistant was directly applied to the dissertation (% reporting)	38	33	16	2
Meeting the language requirement				
"Inadequate undergraduate preparation in foreign languages" cited as a factor increasing time taken to get the degree (%)	22	23	38	32***
Special preparation required in order to meet proficiency requirements (any language)—in per cent	75	80	86	80***
Per cent requiring special preparation in German	56	59	74	73***
Per cent studying German as an undergraduate	65	64	37	39***
Adequacy of undergraduate preparation				
"Inadequate undergraduate preparation in the graduate field of specialization" cited as a lengthening factor (%)	23	23*	26	18

* A single asterisk denotes considerable subfield variability. For social science entries, the major deviant is psychology and for physical science entries, the major deviant is mathematics. In respect to the majority of variables under consideration, data for psychology are similar to data for the physical science fields whereas data for mathematics are similar to data for social science fields. Thus, distinctions between physical sciences and social sciences are to some extent attenuated by the deviant "behavior" of only two of the eight disciplines involved, although major trends in the data, by broad academic area, are not altered.

** The interquartile range indicates the number of years required to account for the middle 50 per cent of the cases in a distribution. Thus, for example, with respect to entry-PHD time lapse among humanities graduates, after the fastest fourth had completed their programs, another 7.5 years were required to account for the next 50 per cent of the graduates.

***Data for foreign language graduates are not included.

TABLE C-2

Factors Associated With Among-Field Differences in Time Lapse: A Correlational Summary

Variable	Rank correlation (rho) with BA-PHD time-lapse means*
Other measures of "duration"	
Mean entry-PHD time lapse	.98
Mean MA-PHD time lapse	.97
Interquartile range (entry-PHD time lapse)	.92**
Characteristic career orientation of graduates in field	
Incidence of predoctoral employment in college teaching	.93
Per cent of total predoctoral employment in teaching service	.85
Per cent of total predoctoral employment in other professional service	—.86
Per cent of graduates reporting postdoctoral duties as "teaching and/or academic administration"—no research duties reported	.89
Graduate attendance	
Mean years of graduate attendance (total)	—.36
Mean years of graduate attendance (full-time)	—.33
Proportion of graduate attendance which was full-time	—.08
Per cent of graduates attending 3-5 summer session	—.89
Continuity of progress toward the doctorate	
"Discontinuity of attendance" cited as "lengthening" factor (%)	.83**
Interruption(s) in attendance prior to completion of course and residence requirements (per cent of graduates reporting)	.96
Interruption following conferral of the master's degree (%)	.91
Attended two or more graduate schools with some non-degree work at one or more (per cent of graduates)	.68
Delayed entry into graduate school (per cent reporting)	.44
Goal development at time of college graduation (% reporting)	
Definite interest in field which became Ph.D. major	—.48
Definite personal goal to pursue graduate study	—.52
Definite personal goal to work toward the Ph.D.	—.37
Financial assistance and support	
Per cent of graduates attributing some lengthening influence to "financial problems"	.72
Reported one or more fellowship grants (%)	.16
Average value of grants reported (mean $'s per recipient)	—.53
Per cent holding research assistantship(s)	—.50
Per cent in field holding teaching assistantships(s)	.13

TABLE C-2, con't.

Factors Associated With Among-Field Differences in Time Lapse: A Correlational Summary

Variable	Rank correlation (rho) with BA-PHD time-lapse means*
Factors related to the dissertation and research	
Per cent of graduates attributing some lengthening influence to "writing the dissertation off-campus . . ."	.81**
Per cent of graduates employed 2 or more years after topic approval	.90
Per cent of graduates in residence 2 or more years after topic approval	—.41
Time lapse, topic approval to completion of dissertation (mean years)	.73
Family obligations and health problems	
Per cent of graduates attributing some lengthening influence to "family obligations"	.62
Per cent of graduates attributing some lengthening influence to "health problems"	.49

* All coefficients based on 15 pairs of ranks. Fields were ranked in descending order with respect to BA-PHD time-lapse means and with respect to each of the variables indicated. Coefficients reflect degree of correspondence between the two sets of ranks.

**In this instance, fields were ranked in terms of median entry-PHD time lapse, not BA-PHD means as for other comparisons.

TABLE C-3

Contrasts Between "Faster" and "Slower" Subgroups Within Each of Two Disciplinary Categories

Variable	"Faster" subgroup*		"Slower" subgroup*	
	Physical sciences %	Humanities %	Physical sciences %	Humanities %
Graduate attendance and predoctoral employment				
Some predoctoral employment reported	52	82	93	98
Mean years of predoctoral employment	1.3 yrs.	3.8 yrs.	6.4 yrs.	12.7 yrs.
More than 4.0 years of graduate attendance	50	37	73	58
More than 1.0 year of part-time attendance	22	25	45	33
Types of duties in postdoctoral employment				
Research and/or research administration	65	(29)**	54	(22)**
Teaching *and* research	10	(22)**	10	(8)**
Teaching, academic administration, or other	25	(49)**	36	(70)**
Continuity of progress toward the doctorate				
Entered graduate school without delay	87	72	48	47
Completed course and residence requirements without interruption(s) in attendance	92	56	50	27
No change in major, bachelor's and doctorate study	78	72	70	62
Goal development at time of bachelor's degree				
Definite plans for graduate study	88	77	62	57
Definite interest in the field that became the Ph.D. major	89	79	79	73
Definite personal goal to work toward the Ph.D.	44	33	19	19
Patterns of financial assistance and support				
Sources of income of major importance—Ph.D. phase				
Research assistantship	36	10	25	3
Fellowship grants	29	21	14	10
Earnings of spouse	21	25	13	16
Teaching assistantships	27	41	27	30
Employment unrelated to graduate program	7	5	17	11
Personal savings	4	12	9	19
Veterans's benefits	13	28	24	34
Held a research assistantship	58	20	40	11
Held a graduate appointment but not research	33	63	44	67
Held no graduate appointment of any kind	9	17	15	22

TABLE C-3, con't.

Contrasts Between "Faster" and "Slower" Subgroups Within Each of Two Disciplinary Categories

Variable	"Faster" subgroup*		"Slower" subgroup*	
	Physical sciences %	Human-ities %	Physical sciences %	Human-ities %
Timing of dissertation research and completion of the preliminary examination				
Dissertation topic formally approved before 12th quarter of graduate study	72	74	47	66
Preliminary exams completed before 12th quarter of graduate study	75	63	53	54
Completed the dissertation in less than 2 years following formal approval of topic	58	46	52	37
Need for special preparation in foreign languages				
Special preparation needed to qualify in German	53	68***	58	80***
Family status				
2 or more dependents at beginning of graduate study	14	10	17	17
2 or more dependents at beginning of Ph.D. phase of graduate program	23	19	42	34
2 or more dependents when degree was conferred	41	36	61	53

* The faster groups consist of individuals who attained the doctorate in less than average time (median BA-PHD) for their respective fields; those in the slower group took more than the average amount of of time to get the degree.

** Data for economics and psychology graduates are inserted here for comparative purposes since these were the only fields outside the natural sciences with a workable number of cases reporting "research" as one of the principal duties in postdoctoral employment.

***Data for foreign language graduates omitted.